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CINARA (*CUPRESSOBIUM*) *SMOLANDIAE* (APHIDOIDEA: APHIDIDAE), A JUNIPER-FEEDING APHID NEW TO BRITAIN

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ABSTRACT

The aphid *Cinara* (*Cupressobium*) *smolandiae* Danielsson & Carter is reported new to Britain following its discovery in June 2012 feeding on *Juniperus communis* on the Dundreggan estate in the Scottish Highlands (VC 96). Details are given concerning identification, feeding position, attendance by ants and parasitism. *Cinara smolandiae* is suggested as a possible candidate for 'UK Red Data Book' status, given its apparent rarity and specialised habitat requirements.

INTRODUCTION

In June 2012 the first author surveyed aphids on the Dundreggan estate, near Invermoriston, Inverness-shire, Scotland, on behalf of the charity 'Trees for Life'. Trees for Life are working to conserve and restore the ancient Caledonian Forest, and biodiversity surveys help to assist in the production of management plans for their estates.

A significant population of old growth *Juniperus communis* woodland is present on the Dundreggan estate, and in June 2012 supported large numbers of the aphid *Cinara juniperi* De Geer feeding on terminal growth. On one bush in this woodland, *C. smolandiae* was found in very small numbers feeding without attendance by ants on thin, but lignified stems. A second, slightly larger population of *C. smolandiae* was found feeding on thin, lignified stems of a juniper growing in an area of mixed birch-juniper woodland, attended by *Formica lugubris* Zetterstedt whose nest was directly adjacent to the bush. Several other *F. lugubris* nests were present in this woodland, but no other colonies of *C. smolandiae* were found.

METHODS

Specimens of *C. smolandiae* were collected by the first author directly from the host plant, preserved in alcohol and sent to the second author at the Natural History Museum (BMNH) for slide mounting and examination.

Cinara (*Cupressobium*) *smolandiae* Danielsson & Carter

Identification

Cinara smolandiae is in *Cinara* subgenus *Cupressobium*, a well-defined taxonomic grouping specifically associated with Cupressaceae. Characteristic features for this group are the very short first hind tarsal segment, the unsclerotised rim of the primary rhinarium on the sixth antennal segment and the relatively few (usually 3) subapical hairs on the antennal terminal process. *Cinara smolandiae* can be distinguished from most other *Cupressobium* by the long rostrum (characteristic of *Cinara* species that feed on the woody tissue of their host plants) and by the presence in apterae of secondary rhinaria on the third antennal segment. Only one other species has these features, *C. dahurica* Szelegiewicz & Holman, known only from *Juniperus pseudosabina* in Mongolia (Blackman & Eastop, 1994).

The Scottish specimens of *C. smolandiae* are much smaller than those described from Sweden by Danielsson & Carter (1993), although morphometric ratios that minimise the effects of size are in general agreement (Table 1). Unfortunately the published keys rely heavily on size differences to distinguish *C. smolandiae* from other juniper-feeding aphids (Danielsson & Carter, 1993; Blackman & Eastop, 1994; Heie, 1995; Remaudière & Binazzi, 2003; Zhuravlev, 2003). These are always liable to fail as discriminants when more specimens are collected and the extent of intraspecific size variation becomes more evident. Taking into account the Scottish specimens of *C. smolandiae*, the four species of *Cinara* subgenus *Cupressobium* with wholly dark hind tibiae that occur on *Juniperus* in Europe can be distinguished as follows:

1 Length of rostrum (= sclerotised part of stylet groove) more than 1.25mm, more than 0.37 × body length (BL). Antennal segment III with 2–8 secondary rhinaria. . . . . *Cinara smolandiae*

– Length of sclerotised part of stylet groove less than 1.25mm, and less than 0.34 × BL. Antennal segment III without secondary rhinaria **2**

2 Abdominal tergite 2 without spinopleural sclerites. Antennal segment V 0.85–1.05 × antennal segment VI (including terminal process) . . . . . *Cinara mordvilkoi* Pasek

– Abdominal tergite 2 with a pair of spinopleural sclerites. Antennal segment V 0.7–0.9 × antennal segment VI (including terminal process) **3**

3 Rostral segment IV 0.12–0.15mm long, and bearing 3–4 accessory hairs. Rostral segments IV + V 0.60–0.85 × as long as hind tarsal segment II. Base of antennal segment VI often slightly constricted at about its midpoint . . . . . *Cinara juniperi* De Geer

– Rostral segment IV 0.15-0.18mm long and bearing 4–6 accessory hairs. Rostral segments IV + V 0.83–0.99 × as long as hind tarsal segment II. Base of antennal segment VI without a constriction. . . . . *Cinara oxycedri* Binazzi

(A comprehensive key to the world's juniper-feeding aphids is available on line at: http://www.aphidsonworldsplants.info/)

Cinara smolandiae and *C. juniperi* are the only species of *Cinara* subgenus *Cupressobium* with wholly dark hind tibiae recorded from *Juniperus communis* in Britain. The appearance in life of *C. smolandiae* at Dundreggan was significantly different from *C. juniperi* feeding on adjoining plants (Plate 1, Figs 1 & 2). *Cinara juniperi* was invariably wax dusted and pinkish-orange brown, whereas *C. smolandiae* varied from light coffee to chestnut brown, with only a light wax dusting on the head and thorax.

Ecology

Prior to the publication of this paper, four species of *Cinara* subgenus *Cupressobium* that may feed on *J. communis* were known from Britain: *C. cupressi* (Buckton); *C. fresai* Blanchard; *C. juniperi* and *C. tujafilina* (Del Guercio). *Cinara cupressi*, *C. fresai* and *C. tujafilina* are non-native generalists that feed on Cupressaceae and are unlikely to be found in natural stands of *J. communis*. *Cinara juniperi* is native and feeds on *J. communis* and its varieties in natural habitats, parks and urban environments. *Cinara mordvilkoi* is not known from Britain, but like *C. smolandiae* it has been found only in natural stands of *J. communis* or its varieties.

Aside from its morphological differences, *C. smolandiae* is unlikely to be confused with *C. mordvilkoi* or *C. juniperi* since according to Blackman & Eastop (1994) it feeds 'in bark crevices or rust cankers 1–2m above ground on stems of old (50-year plus) trees of *Juniperus communis*', where, according to Danielsson & Carter (1993) it

Table 1 Morphometric data for apterous viviparae of *Cinara smolandiae* (data on Swedish apterae are from Danielsson & Carter, 1993)

	Range of values (mm)	
	Scotland (2 individuals)	Sweden (10 individuals)
Body length (BL)	2.86–2.98	3.33–4.25
Total antennal length (ANT)	1.45–1.51	1.62–1.81
Antennal segment III	0.496–0.550	0.550–0.620
Antennal segment IV	0.183–0.194	0.232–0.286
Antennal segment V	0.294–0.302	0.300–0.355
Antennal segment VI (incl. PT)	0.238–0.286	0.300–0.340
Antennal terminal process (PT)	0.049–0.059	0.054–0.082
Rostrum length	1.26–1.45	1.62–1.76
Rostral segments IV + V	0.298–0.302	0.300–0.340
Hind tarsus segment II	0.357–0.385	0.371–0.418
Hind femur	1.27–1.34	1.57–1.81
Hind tibia	1.94–2.08	2.21–2.53
Diameter of siphuncular cone	0.37–0.49	0.45–0.68
No. of secondary rhinaria III:IV:V	2–4: 2–4: 1–2	3–8: 3–6: 2–4
No. of hairs on base of ANT VI	14–16	14–15
No. of accessory hairs on R IV + V	7–8	6–10
RATIOS:		
ANT/BL	0.51–0.52	0.42–0.50
Antennal PT/base of VI	0.23–0.27	0.22–0.33
Rostrum/BL	0.44–0.48	0.39–0.45
Rostral IV + V/Hind tarsus II	0.77–0.85	0.79–0.86

is 'assiduously attended by worker ants . . . '. However, although on one of the plants at Dundreggan *C. smolandiae* was assiduously attended by *Formica lugubris*, which nested adjacent to the bush, unlike the Swedish specimens, it fed on thin but lignified stems, where its colour helped it to blend in (Fig. 1). On the second Dundreggan plant, *C. smolandiae* also fed on thin, lignified stems, but without ant attendance and with no *F. lugubris* nests in close proximity. Although there are many old specimens of *J. communis* at Dundreggan, neither of the bushes upon which *C. smolandiae* was found is likely to be greater than 50 years old and Alan Watson Featherstone (pers. comm.) reports that most of the trees affected by juniper rust (*Gymnosporangium clavariiforme*) at Dundreggan are not in the same area as most of the *F. lugubris* nests.

Danielsson & Carter (1993) describe Swedish *C. smolandiae* as occurring in small, tight but mobile colonies of 6–8 apterae, attended separately by a *Camponotus* sp., *Formica polyctena* Förster and *F. rufa* (L.). The Dundreggan colonies also comprised small, tight groups of apterae, but no evidence of high mobility for these colonies was found during the survey.

On the same bush where it was attended by *F. lugubris*, *C. smolandiae* was parasitised by the aphidiine *Pauesia laricis* (Haliday), a generalist primary parasitoid of *Cinara* spp., but not recorded previously targeting aphids from the subgenus *Cupressobium*. The aphid mummies were blue-black in colour. Danielsson & Carter (1993) report a *Pauesia* sp. reared from *C. smolandiae* in Sweden, but do not identify it to species and Ulf Gärdenfors (pers. comm.) has collected a *Pauesia* sp. from *C. smolandiae* in Sweden, but it was from the subgenus *Paraphidius* whereas *P. laricis* is in the subgenus *Pauesia*.

Fig. 1. A small group of *Cinara smolandiae* feeding on a thin lignified stem of juniper, Dundreggan Estate, Inverness-shire. Photo: Ed Baker.

Cinara smolandiae could be easily overlooked, particularly when *C. juniperi* is abundant, though *C. juniperi* occupies a different ecological niche. Observations at Dundreggan (Baker, 2012, Dransfield & Brightwell, 2013) suggest that in early summer, *C. juniperi* feeds primarily on the needles of fresh terminal growth, not stems. Attendance by ants is facultative, but in June 2012 *F. lugubris* ignored *C. juniperi* feeding on a bush a few feet away from the bush harbouring *C. smolandiae*, which was assiduously attended. Elsewhere on the estate, *F. lugubris* was observed casually attending *C. juniperi*, but was frequently observed to glean *C. juniperi* honeydew from needles. It may be that foraging in this way is more rewarding and involves less energy expenditure than manoeuvring amongst needles to reach aphid colonies feeding on terminal growth. In July 2013, *C. juniperi* was present in very small numbers, but feeding at the base of stems and assiduously attended by *F. lugubris*. The change in feeding site probably reflects the changing nutritional quality of the host, whereas the ant attendance is interpreted as evidence of the adaptability of *F. lugubris* in terms of its foraging strategy. *Cinara smolandiae* was not found at Dundreggan in 2013, and aphids generally were scarce in July, including important mutualist species like *Symydobius oblongus* (von Heyden) on birch. Thus a species that is casually attended when mutualist aphids are abundant may be assiduously attended when they are scarce.

Distribution

Prior to the publication of this paper, *C. smolandiae* was only known on *J. communis* in Sweden (Danielsson & Carter, 1993) and Finland (Albrecht, 2010) and on *J. communis* ssp. *nana* (given as *J. sibirica*) in the Murmansk region of north-west Russia (Vitaly Zhuravlev pers. comm. & Zhuravlev 2003).

Discussion

The discovery of *C. smolandiae* in Scotland is not surprising given the extensive stands of *J. communis* in parts of the Scottish Highlands and its similar biogeography to Sweden, Finland and north-west Russia. *Cinara smolandiae* must be considered indigenous given its habitat and ecological associations. As such, it is the first indigenous tree aphid found in Britain since Whitehead (1995) reported the discovery of *Stomaphis graffii* Cholodkovsky on *Acer campestre*.

The evidence from Scotland is that *C. smolandiae* is a myrmecophile that in early summer feeds in small colonies on thin but lignified stems of *J. communis*. Given the rostrum measurements of the Dundreggan specimens, it is very likely they also spend part of their lifecycle feeding on thicker stems, in line with the observations of Danielsson & Carter (1993) in Sweden. Feeding in such situations the aphids are readily accessible to ants, whereas observations of foraging *F. lugubris* at Dundreggan suggest it is a clumsy mover on needle-covered terminal stems of *J. communis*, frequently falling off or struggling to get a good position from which to attend aphids.

Within Britain, the remaining stands of *J. communis* should be surveyed to establish which aphid species are present. In particular, old-growth *J. communis* woodlands that are periodically colonised by juniper rust and exploited by ants may harbour *C. smolandiae*. Another aphid species worth searching for in old growth *J. communis* woodland is *Gootiella tremulae* Tullgren. Currently it is known in Britain only from juniper roots (Carter & Danielsson, 1993), but elsewhere in Europe is recorded forming bag like leaf galls on *Populus tremula*, before it migrates to juniper roots in summer (Danielsson, 1990; Blackman & Eastop, 1994). Thomas, El-Barghathi and Polwart (2007) report that in Eastern Europe, juniper is a common component of developing *Populus tremula-Pinus sylvestris* woodland, and the work of organisations such as Trees for Life means that this habitat may become more common in parts of the Scottish Highlands, providing an ideal habitat for *G. tremulae*.

No British aphids feature in 'Red Data Book lists' or other nature conservation designations, but *C. smolandiae* may be a candidate for such given its apparent rarity in Europe, the rarity of old growth *J. communis* in Britain and the emerging threat to *J. communis* in Britain posed by the invasive fungus-like pathogen *Phytophthora austrocedrae* Gresl. & E. M. Hansen.

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Sharon Reid of the Food and Environment Research Agency alerted the first author to the opportunity to survey aphids at Dundreggan and Alan Watson Featherstone (Trees for Life) facilitated the survey, providing an invaluable tour of part of the estate and wonderful photographs. Diana Percy (BMNH) kindly prepared slides of *C. smolandiae* for examination by the second author. Dr Roy Danielsson (Lund Museum of Zoology) and Vitaly Zhuravlev (Schmalshausen Institute of Zoology, Kiev) provided useful information about *C. smolandiae* in Sweden and Russia, respectively. Professor Ulf Gärdenfors (Swedish Species Information Centre, Uppsala) provided information about parasitoids of *C. smolandiae* in Sweden. Dr Gavin Broad (BMNH) confirmed the identification of *Pauesia laricis*.

References

Albrecht, A. 2010. *Atlas of the Aphids of Finland*. Finnish Museum of Natural History, University of Helsinki. World Wide Web publication. http://www.luomus.fi/elaintiede/hyonteiset/tutkimus/kirvat/atlas.htm.

Baker, E. A. 2012. Aphids and their parasitoids at the Dundreggan estate. (unpublished report to 'Trees for Life').

Blackman, R. & Eastop, V. 1994. *Aphids on the World's Trees. An Identification and Information Guide*. CAB International, Wallingford, UK. Updated at: http://www.aphidsonworldsplants.info/

Carter, C. I. & Danielsson, R. 1993. New and additional records of gall-forming aphids of the family Pemphigidae in Britain. *Entomologist* **112**: 99–104.

Danielsson, R. & Carter, C. 1993. *Cinara smolandiae* sp. n. from *Juniperus communis* in Sweden and a key to the species in the subgenus *Cupressobium* Börner (Homoptera: Aphidoidea: Lachnidae). *Entomologica Scandinavica* **23**: 4: 474–479.

Danielsson, R. 1990. The life cycle of *Gootiella tremulae* Tullgren 1925, with descriptions of all viviparous morphs and a redescription of *Gootiella alba* Shaposhnikov 1952. *Entomologica Scandinavica* **20**: 413–428.

Dransfield, R. D. & Brightwell, R. 2013. Aphids and their natural enemies and mutualists at Dundreggan, Scotland. (unpublished report to 'Trees for Life').

Heie, O. 1995. The Aphidoidea (Hemiptera) of Fennoscandia and Denmark. VI. – Family Aphididae: Part 3 of tribe Macrosiphini of subfamily Aphidinae and family Lachnidae. *Fauna Entomologica Scandinavica* **31**: 1–222. E. J. Brill. Leiden.

Remaudière, G. & Binazzi, A. 2003. Les *Cinara* du Pakistan II. Le sous genre *Cupressobium* (Hemiptera, Aphididae, Lachninae). *Revue Française d'Entomologie* **25**: 85–96.

Thomas, P. A., El-Bargathi, M & Polwart, A. 2007. Biological Flora of the British Isles: *Juniperus communis* L. *Journal of Ecology* **95**: 1404–1440.

Whitehead, P. F. 1995. *Stomaphis graffii* Cholodkovsky (Homoptera: Aphididae: Lachnidae) new to the British fauna. *Entomologist's Gazette* **46**: 161–162.

Zhuravlev, V. V. 2003. The Aphids of the genus *Cupressobium* (Homoptera, Aphidoidea, Lachnidae) of Eastern Europe, Caucasus and Middle Asia. *Vestnik Zoologii* **37**: 13–30.

SHORT COMMUNICATION

***Phytomyza krygeri* Hering (Diptera: Agromyzidae) and its associated parasitoid *Seladerma simplex* (Thomson) (Hymenoptera: Pteromalidae) in Kent.** – On 24.vii.2012 I collected some seed capsules of *Aquilegia vulgaris* L. at Cuxton, Kent (TQ7067). The capsules contained seeds and also the puparia of the agromyzid seed feeder *Phytomyza krygeri* Hering. The puparia were retained in a well ventilated and shaded garden shed and on 12.v.2013 five *P. krygeri* emerged. On 9.vi.2013 one male and one female *Seladerma simplex* (Thomson) emerged. *Seladerma simplex* was first recorded in Great Britain, as *Telepsogos simplex* (Thomson), by Graham (1967). I am not aware of any further records for Great Britain. This species is also known from the Czech Republic, Germany, Denmark, The Netherlands, and Sweden and the only known host is *P. krygeri* (Noyes, 2013). *Seladerma simplex* can be identified by reference to Graham (1969).

I thank L. Clemons for the identification of *P. krygeri*. The specimens of *S. simplex* have been placed in the collections of R. R. Askew whom I thank for confirming their identification. – M. T. JENNINGS, 206 Lower Higham Road, Gravesend, Kent, DA12 2NN.

REFERENCES

Graham, M. W. R. de V. 1967. *Phytomyza krygeri* Hering (Dipt., Agromyzidae) and its chalcid parasite *Telepsogos simplex* (Thomson), new to Britain. *Entomologist* **100**: 77–78.

Graham, M. W. R. de V. 1969. The Pteromalidae of North-Western Europe (Hymenoptera: Chalcidoidea). *Bulletin of the British Museum (Natural History) Entomology* **16**: 1–908.

Noyes, J. S. 2013. Universal Chalcidoidea Database. World Wide Web electronic publication. http://www.nhm.ac.uk/chalcidoids

THE SWARMING HEIGHTS OF SOME COMMON BRITISH FANNIIDAE (DIPTERA)

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ABSTRACT

The minimum and maximum heights of swarms of *Fannia* species were recorded in four west Northamptonshire (VC32) woods over the period May 2008 to June 2013. Fourteen species of *Fannia* were found in total. Eight of the 14 species were confirmed as swarming, with each species exhibiting distinct, but overlapping, height ranges. At the lower end of the spectrum, *Fannia lustrator* (Harris) swarmed from 0.1m to just above 1m above ground level, whilst at the higher end, *Fannia polychaeta* (Stein) swarmed from approximately 1m to 8.3m above ground level.

INTRODUCTION

Most behavioural entomologists will no doubt be aware that many fly species form swarms in distinct layers, from just above ground level up to many metres. This behaviour is most easily observed in sunny woodland glades. A review of the literature revealed swarming behaviour in *Trichocera borealis* (Lackschewitz) (Trichoceridae) at 50–100mm above low grass tussocks (Syrjamaki, 1968), the chironomid midges *Einfeldia dissidens* (Walker) from 1–3m and *Chironomus plumosus* (L.) at 1–5m above ground level (Hirabayashi & Nakamoto, 2001), *Anopheles funestus* (Giles) (Culicidae) at 2–4m above ground level (Charlwood *et al.*, 2003), *Fannia conspicua* (Malloch) (Fanniidae), a non-European species, at heights of 0.5–4m (Mullens & Gerry, 2006) and the muscid *Hydrotaea cyrtoneurina* (Zetterstedt) at 1–3m (Alderman, 2010).

Essentially a woodland family, the males of various species of Fanniidae (Diptera, Calyptratae) can be observed during sunny conditions, swarming in glades, over paths and beneath overhanging branches. According to the literature, associated females can almost always be swept from low vegetation in the vicinity (d'Assis-Fonseca, 1968; Oosterbroek, 2006). The 60 British species of Fanniidae can be identified with Rozkošný, Gregor & Pont (1997), while d'Assis-Fonseca's (1968) key to British Muscidae (which then included Fanniidae) uses older names, but is still useful as an alternative key.

General observations and previous research revealed that some species of Fanniidae formed clearly defined swarms at different heights from just above ground level up to at least 3.5m (Alderman, 2009). Given the published reports of species-related swarming height ranges, this suggested that swarming heights in the family may also be correlated to species. To further investigate this possibility, detailed measurements of the minimum and maximum heights of fanniid swarms were made. This paper is an extension of a presentation on this subject made to the Dipterists Forum 2012 Dipterists' Day annual meeting (Alderman, 2013) but incorporating additional data collected during the first half of 2013.

Methods

Data were collected from dedicated visits to three sites in the Northampton area of VC32: Delapre Woods (SP755582), Everdon Stubbs (SP605566) and Burcote Wood (SP690466). Data were also collected from High Wood (SP593548) during two recording trips by the Northants and Peterborough Diptera Group. Delapre Woods is a 15ha mixed wood located on the southern boundary of Northampton, managed by Northampton Town Council. Everdon Stubbs is a 29ha ancient mixed woodland located in west Northamptonshire between the villages of Everdon and Farthingstone, managed by the Woodland Trust. High Wood is a 16.5ha mixed wood located within a few miles of Everdon Stubbs and managed by the Wildlife Trust. These three woods are essentially similar habitats, containing ash (*Fraxinus excelsior*), oak (*Quercus* sp.), field maple (*Acer campestre*), sweet chestnut (*Castanea sativa*), sycamore (*Acer pseudoplatanus*), beech (*Fagus sylvatica*) and various conifers, together with significant amounts of standing and fallen deadwood. Burcote Wood is a 3.8ha reclaimed former gravel quarry planted with native broadleaves (oak, ash, field maple, alder (*Alnus* sp.) and cherry (*Prunus avium*) between 1985 and 1987, located on the southern outskirts of Towcester (close to the Silverstone racecourse) and managed by the Woodland Trust.

The four study woods were visited over the period of May 2008 to June 2013. Systematic searches were made for swarming Fanniidae, both on and off the paths, recording the species along with the minimum and maximum swarm heights above ground level, as they were encountered. Swarms here are defined as one or more individuals maintaining a relatively stationary position. The location of each swarming site was mapped on a GPS and visited only once. During the visits, both more than one species of Fanniidae and other non-Fanniidae species were occasionally found swarming together at the same site. To avoid any inter-species interactions affecting the results, data were only recorded from those sites at which a single species of fanniid was swarming. A long-handled net, enabling a 4.5m reach was employed, which limited the search height but was the maximum possible for reliable sampling.

Results

Fourteen species of Fanniidae were found in the study woods, all from the genus *Fannia* Robineau-Desvoidy (Table 1). Eight of these were definitely swarming, with defined height ranges for each species, from 0.1–1.2m for *F. lustrator* (Harris), to approximately 1–8.5m for *F. polychaeta* (Stein) (Fig. 1). The height ranges were not exclusive, with all overlapping to some extent. The degree of overlapping varied from barely, for *F. lustrator* and *F. polychaeta*, to complete, with *F. coracina* (Loew) swarming within the height range of *F. armata* (Meigen) and *F. sociella* (Zetterstedt) within the range of *F. serena* (Fallén) (Fig. 1). The remaining six species were not found in sufficient numbers to confirm whether they were or were not swarming (Table 1).

Discussion

It may be tempting to use the swarm height ranges to identify Fanniidae species in the field. This is inadvisable, not even as an approach to narrow down the possibilities. Leaving aside the overlapping ranges, it should also be borne in mind that the eight recorded species in this study represent only some 13% of the 60

Table 1. A combined list of the *Fannia* species and confirmed number of swarms found in the four study woods (Delapre Woods, Everdon Stubbs, High Wood and Burcote Wood).

Species	No. of Swarms	Species	No. of Swarms
F. aequilineata Ringdahl	–	*F. polychaeta* (Stein)	21
F. armata (Meigen)	140	*F. postica* (Stein)	–
F. coracina (Loew)	17	*F. scalaris* (Fabricius)	–
F. lustrator (Harris)	10	*F. serena* (Fallén)	5
F. molissima (Haliday)	–	*F. sociella* (Zetterstedt)	25
F. pallitibia (Rondani)	–	*F. subsimilis* Ringdahl	7
F. parva (Stein)	–	*F. umbrosa* (Stein)	11

known British species of Fanniidae and that the other species may (and probably do) have similar swarming height ranges. There is also the issue with identifying a fanniid in the first place; with most being 3–4mm grey to black flies without obvious distinguishing features. Whilst a male *F. lustrator*, at 9mm long with a distinctive grey abdomen may be the exception, the other species of British Fanniidae look very similar to the many anthomyiid and empidid flies which also form similar-sized swarms, making reliable field-identification a near impossibility.

Just why at least the eight observed fanniid species swarm at different heights is not currently known and this study offered no further clues. With swarms generally thought to have a mating function (Sullivan, 1981), there may be a correlation to the heights at which females are found, possibly related to food sources, but no females were found to verify this suggestion.

Not much else seems to be known about the swarming habits of British Fanniidae. The perceived wisdom, for example, is that almost all fanniid species form swarms,

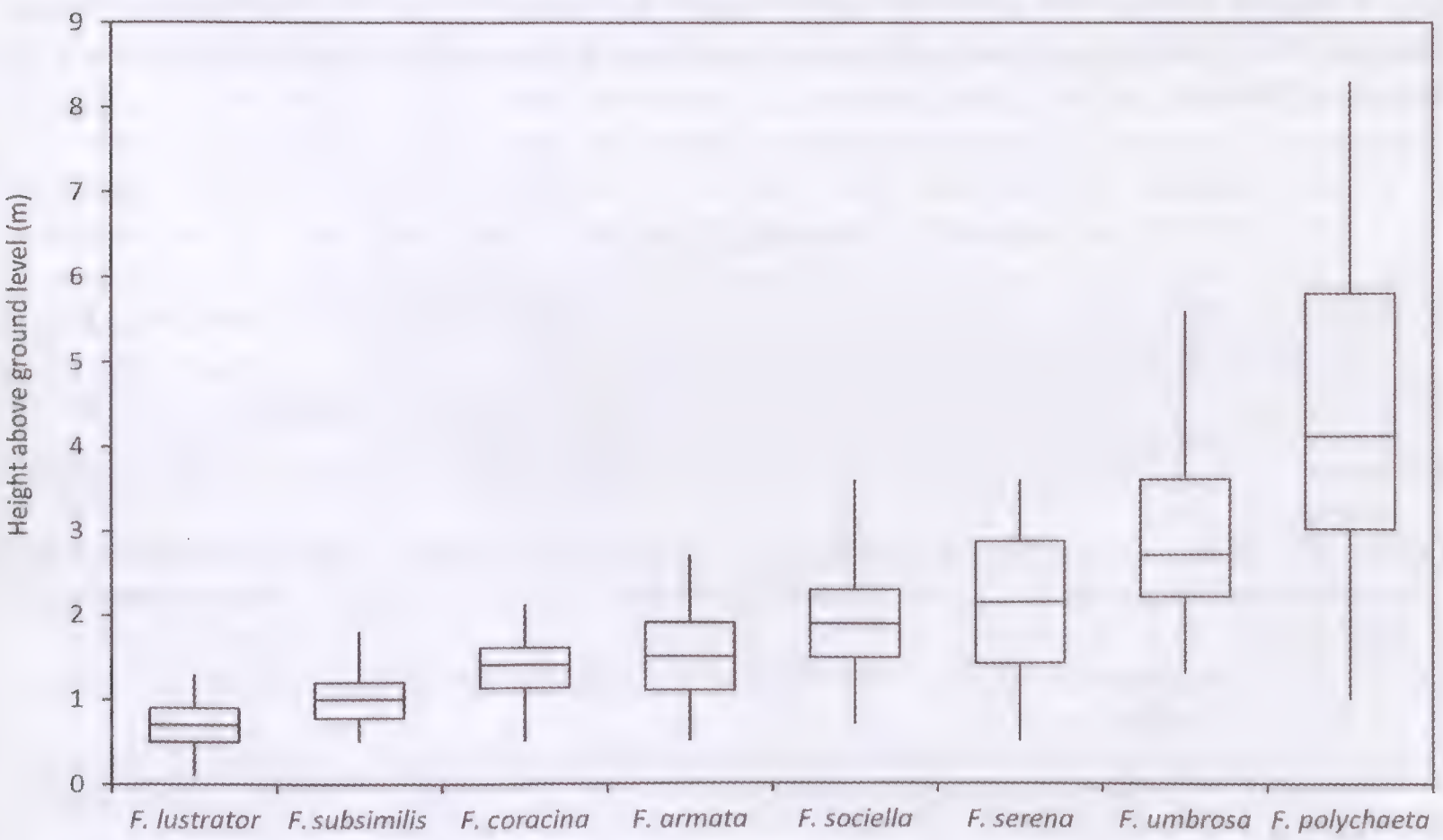

Fig. 1 The combined swarm minimum, maximum, inter-quartile range and median heights above ground level of the eight confirmed swarming fanniid species recorded in the four study woods (Delapre Woods, Everdon Stubbs, High Wood and Burcote Wood).

but opinions are divided over even this basic characteristic. In the three main publications on Diptera, no mention of Fanniidae swarming is made in Marshall (2012) (the World's families), whilst Oosterbroek (2006) (European families) and Colyer and Hammond (1968) (British families) both state that the males of several species form swarms, which suggests that some do not. In the more specific publications, Rozkošný, Gregor & Pont (1997) state that *F. glaucescens* (Zetterstedt) (now known as *F. lucidula* (Zetterstedt)) is the only species that does not swarm. D'Assis-Fonseca (1968), on the other hand, gives *F. glaucescens* and *F. norvegica* Ringdahl as not swarming and *F. tuberculata* (Zetterstedt) and *F. minutipalpis* (Stein) as usually obtained by high-level sweeping from silver birch (*Betula pendula*) foliage. In this study, six of the 14 species were found in too few numbers to draw any definite conclusions as to whether they were or were not swarming (Table 1). In addition, the lesser housefly, *F. cannicularis* (L.) was found indoors, undertaking its characteristic patrolling pattern underneath a lamp shade, which probably counts as swarming. Some species appear to hover singly, whilst others may form 'atypical' swarms. D'Assis-Fonseca (1968), for instance, records *F. corvina* (Verrall) and *F. subpubescens* Collin as 'whirling erratically' at a height of 5–7m.

With only some 13% of the total species found in sufficient numbers to record their swarming habits (Table 1), this is not of course a complete record of the swarming height ranges of the British Fanniidae. To accomplish this, the swarming behaviour of the remaining 52 British species also needs to be recorded. Further work is obviously required before a comprehensive account of the swarming habits of the British Fanniidae can be compiled.

Acknowledgements

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References

Alderman, J. 2009. The swarming orientation of *Fannia armata* (Diptera: Fanniidae). *British Journal of Entomology and Natural History* **22**: 1–6

Alderman, J. 2010. Microclimatic factors and the diurnal swarming pattern of *Hydrotaea cyrtoneurina* (Zetterstedt) (Diptera: Muscidae). *Dipterists Digest* **17**: 147–156.

Alderman, J. 2013. Off the beaten track: a season of swarm chasing. *Bulletin of the Dipterists Forum* **75**: 16–17.

Charlwood, J. D., Thompson, R. & Madsen, H. 2003. Observations on the swarming and mating behaviour of *Anopheles funestus* from southern Mozambique. *Malaria Journal* **2**: 1–10.

Colyer, C. N. & Hammond, C. O. 1968. *Flies of the British Isles*. 2nd Ed. Frederick Warne & Co. Ltd., London.

D'Assis-Fonseca, E. C. M. 1968. Diptera Cyclorrhapha Calyptrata. Section (b) Muscidae. *Handbooks for the identification of British insects. 10, 4(b)*. Royal Entomological Society, London.

Hirabayashi, K. & Nakamoto, N. 2001. Field study on acoustic response of Chironomid Midges around a hypereutrophic lake in Japan. *Annals of the Entomological Society of America* **94**: 123–128.

Marshall. S. A. 2012. *Flies: the Natural History and Diversity of Diptera*. Firefly Books Ltd., Ontario, Canada.
Mullens, B. A. & Gerry, A C. 2006. Life history and seasonal abundance of *Fannia benjamini* complex (Diptera: Muscidae) in southern California. *Journal of Medical Entomology* **43**: 192–199.
Oosterbroek, P. 2006. *The European Families of the Diptera*. KNNV Publishing, Utrecht, Holland.
Rozkošný, R., Gregor, F. & Pont, A. C. 1997. *The European Fanniidae (Diptera). Acta Scientiarum Naturalium Academiae Scientiarum Bohemicae Brno* **31** (2): 80 pp.
Sullivan, R. T. 1981. Insect swarming and mating. *Florida Entomologist* **64**: 44–64.
Syrjamaki, J. 1968. Diel patterns of swarming and other activities of two arctic Dipterans (Chironomidae and Trichoceridae) on Spitsbergen. *Oikos* **19**: 250–258.

SHORT COMMUNICATION

Noteworthy Hemiptera-Heteroptera from Whitecross Green Wood, Oxfordshire. – This nature reserve is a small area of ancient woodland on the border between Oxfordshire and Buckinghamshire, 12km north-east of Oxford, managed by the Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT). The popular entomological interest in the site relates to its colonies of Black Hairstreak butterflies, *Satyrium pruni* (L.) (Lepidoptera: Lycaenidae) and Purple Emperor butterflies, *Apatura iris* (L.) (Nymphalidae), which each year attract a large number of enthusiasts who eagerly scan the bushes and tree-tops with binoculars. There are, however, other insects of note in the wood, for those who are prepared to venture into different entomological orders, and in recent years, I have recorded three noteworthy species of Heteroptera, each categorised as Notable B by Kirby (1992).

On 7.viii.2008, I swept a single specimen of the groundbug *Megalonotus antennatus* (Schilling) (Lygaeidae) from a sparsely vegetated clearing at the end of the south-westerly main ride of the wood (National Grid Reference SP600144), followed by two more eight days later from the same spot. A further two examples of the groundbug were taken in a pitfall trap sunk into the clearing, between 20.vi. and 2.vii.2011. This bug had not been reported previously from Oxfordshire (Kirby, *op. cit.*), but celebrations of a new addition to the vice-county list were short-lived. Although this part of the wood is within both the historic and modern county of Oxfordshire, it does not reside within Watsonian Oxfordshire (VC23). The vice-county boundary in this region departs from the administrative county boundary in a carefully-drawn loop, taking the whole of Whitecross Green Wood into Watsonian Buckinghamshire (VC24), a county from which the bug is already known (Kirby, *op. cit.*). Consequently, although this is a new county record in terms of the county tables of Massee (1955), which are based upon historic county boundaries, in terms of the modern use of vice-counties for distribution, it isn't.

On the same day, and in the same spot, that I found my first specimen of *M. antennatus*, I swept two examples of the lacebug *Tingis reticulata* Herrich-Schaeffer (Tingidae). Kirby states that this insect is associated with Bugle, *Ajuga reptans* L. (Lamiaceae) and although I did not notice the plant at the time, subsequent searches for it, both in this and other clearings in the wood, have delivered more specimens of the bug, taking five on 24.v.2010 and another three on 6.v.2011. In terms of county records, according to Kirby, this insect is in the converse situation to that of the aforementioned ground bug, having already been recorded from Oxfordshire, but not Buckinghamshire. When the recent entomological literature failed to produce a record for Buckinghamshire as well, I again started

to celebrate a new vice-county record . . . until I checked Massee (*op. cit.*), which clearly showed the bug recorded from both counties, and Le Quesne (1954) provided a specific record for Amersham. Foiled again!

The sparse clearings of the wood are maintained by a programme of regular mowing by BBOWT, and Kirby's comments on the conservation of *T. reticulata* indicate that this may be important for the growth of bugle, and thereby for the presence of the bug in the wood. Short vegetation allows the sweep net to penetrate closer to the ground, and I often collect seldom-swept species in such situations. These circumstances may therefore be responsible for my discovery of both of the above species. The cuttings from the mowing are heaped into stacks at intervals along the edges of the rides and clearings, and my capture of a Hot-bed Bug, *Xylocoris galactinus* (Fieber) (Anthocoridae), in the same sweep as my first specimens of the groundbug and lacebug, suggested that there may be other Heteroptera of interest on this refuse. Hand searching the stacks did not produce anything of note, and served only to irritate the occasional Grass Snake, *Natrix natrix* (L.), taking refuge there. However, on 25.vi.2010, I brought a Halfords car vacuum cleaner to the wood, and using this as a suction sampler (Ryan, 2011), passing it over the surface of the stacks, I obtained a singleton of the predatory minute bug *Loricula coleoptrata* (Fallén) (Microphysidae), formerly *Myrmedobia coleoptrata* (Fallén). A return visit on 2.vii.2011, using the same method, produced another five examples. All the specimens were males, less distinctive than the females, which look like small beetles (hence the name). Given that I find the key to this genus in Southwood & Leston (1959) rather wanting, the specimens were identified using Péricart (1972).

In terms of new county records, this species is in the same vexing situation as *M. antennatus*, being previously unrecorded from Oxfordshire, but already known from Buckinghamshire, denying a new vice-county record. However, after much labour, the bug's status in Oxfordshire is now resolved, by my recent discovery of the insect in Waterperry Wood, Oxfordshire (modern, historic and Watsonian) (SP608097). Several nymphs were taken from moss on 8.vi.2013 using a Vax LiFE handheld vacuum cleaner (Ryan, 2012) and reared at home to adult. Consequently, I am pleased to report that *L. coleoptrata* is indeed new to Oxfordshire, however the county is defined. – R. P. Ryan, 38 St John Street, Oxford, OX1 2LH (email: *RobRyanBugs@gmail.com*).

References

Kirby, P. 1992. *A review of the scarce and threatened Hemiptera of Great Britain. UK Nature Conservation No 2*. Joint Nature Conservation Committee, Peterborough.

Le Quesne, W. J. 1954. Some new county records of Hemiptera Heteroptera. *Entomologist's Monthly Magazine* **90**: 250.

Massee, A. M. 1955. The county distribution of the British Hemiptera-Heteroptera, second edition. *Entomologist's Monthly Magazine* **91**: 7–27.

Péricart, J. 1972. *Faune de L'Europe et du Bassin Méditerranéen 7 Hémiptères Anthocoridae, Cimicidae et Microphysidae de L'Ouest-Paléarctique*, Masson, Paris.

Ryan, R. P. 2011. The use of a car vacuum cleaner for collecting Hemiptera-Heteroptera from mosses. *Entomologist's Record and Journal of Variation* **123**: 161–162.

Ryan, R. P. 2012. The use of a domestic vacuum cleaner as a suction sampler. *British Journal of Entomology and Natural History* **25**: 224–225.

Southwood, T. R. E. & Leston, D. 1959. *The land and water bugs of the British Isles*, Frederick Warne & Co. Ltd, London.

DYRODERES UMBRACULATUS (HETEROPTERA: PENTATOMIDAE: SCIOCORINI) NEW TO BRITAIN, AND RELATED POSSIBLE IMMIGRANTS

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ABSTRACT

Details are given of the occurrence of *Dyroderes umbraculatus* (F.) in a suburban nature reserve in west London in June 2013. Major diagnostic characters are given, also a detailed description of the species, and details of its status and habitats in North West Europe. Line drawings and colour photographs are included. The possibility is discussed that certain other species of Sciocorini, already present in North West Europe, might spread to Britain. For these potential colonists, tables summarise current distributions, hostplants, habitats, and features.

INTRODUCTION

On 29.vi.2013 Ken Merrifield (RKM) and his wife Rita (RMM) visited Perivale Wood Local Nature Reserve (The Gilbert White Memorial Reserve; vice-county 21, Middlesex; National Grid reference TQ1683) to carry out general entomological recording. Whilst working mixed hedgerow vegetation along Woodland Path, beside Little Elms Meadow, they swept an unfamiliar shieldbug from an indeterminate hostplant. They retained the bug but otherwise took little notice of it at the time. Some months later, referring to British literature (Southwood & Leston (1959) and Hawkins (2003)), RKM found that the keys led, rather unconvincingly, to *Sciocoris cursitans* (F.); this is designated a 'Notable' species in Kirby (1992), known only from a few counties of southern England, mainly coastal. He therefore sent a photograph of the specimen to BSN, who recognised the distinctive form and markings of *Dyroderes umbraculatus* (F.), recorded from the Channel Isles as long ago as 1961 (LeQuesne, 1984) but not from Britain. BSN confirmed the identity by reference to Derjanschi & Péricart (2005) and Wachmann, Melber & Deckert (2008).

SITE DESCRIPTION

Perivale Wood has an area of 11 hectares (27 acre), comprises mainly oak woodland, and is located in the suburbs of west London. It is bounded to the north by the Grand Union Canal, to the south by a railway embankment and houses, to the west by industrial units and to the east by houses and recreational open space. The reserve has a variety of habitats: 7.3 ha of ancient, mixed, oak woodland; 2 ha of grazed pasture land; 0.8 ha of damp scrub; and 0.8 ha of disturbed land having a very different vegetation from the rest of the wood. There are also three ponds and two small streams as well as hedgerows which would originally have enclosed pasture.

MAIN DIAGNOSTIC CHARACTERS OF *D. UMBRACULATUS*

Dyroderes umbraculatus belongs to a distinctive tribe of shieldbugs, the Sciocorini. These are mainly ground dwelling, thermophile species, with a somewhat flattened form, suited to hiding in crevices, and a broad almost circular abdomen. Their tapering hemelytra exposes the broad, banded, connexivum – and often also part of

Fig. 1. Species of Sciocorini known from the British Isles: *Dyroderes umbraculatus* (left); *Menaccarus arenicola* (centre); *Sciocoris cursitans* (right). (Adapted from Jean Péricart's drawings in Derjanschi & Péricart (2005), with permission, © 2005 Féderation Française des Sociétés de Sciences Naturelles, www.faunedefrance.org)

the abdomen. Other characters of the tribe are the transverse pronotum with sharp lateral edges, usually converging anteriorly from the hind angles; and the antennal tubercles hidden from above. Coloration is typically shades of brown, modified by a dense covering of very fine punctures, often spaced by little more than their diameter and often with dark pigmentation.

The present species is the largest of the European Sciocorini, being about 8 mm in length, compared with other species of the tribe which are typically in the range 5–7 mm. The pronotum is diagnostic and a useful field character: it is about twice as wide as the head, with almost semi-circular side margins, and a large white patch on the front margin either side of the head; this patch has just a few large scattered dark punctures. The legs are yellowish-white with numerous conspicuous black spots.

Figure 1 illustrates the general form of this species, and of the other two sciocorids currently known from the British Isles; Plate 2, Figs 1–3, shows *D. umbraculatus* in dorsal, lateral and ventral views.

Compared with other British shieldbugs, *D. umbraculatus* is most similar in size to the common and widespread Birch species *Elasmucha grisea* (L.) The latter is quite variable in coloration and examples having less saturated pigmentation may resemble *D. umbraculatus* in general colour; added to which, both species have the connexivum (the lateral foliaceous area of the abdomen) conspicously 'chequered'. However, even a cursory inspection of the shape and markings of the pronotum of *D. umbraculatus* should eliminate any confusion. *Dyroderes umbraculatus* also resembles *Eurygaster* species in shape, but it is noticeably smaller and distinguished by the shape of its scutellum, 'triangular' rather than oblong.

Detailed description of *D. umbraculatus*

Characteristics additional to the diagnostic field characters mentioned above are as follows.

Puncturation – The apparent colour of pentatomids is generally modified by the spacing, distribution and colour of surface punctures. In *D. umbraculatus* these are blackish, finer and more closely spaced than in other tribes; they cover the foreparts and hemelytra except membrane. Other exceptions are as follows. Head: not on apex of central lobe (clypeus). Pronotum: not on the small pale markings; those on the larger white lateral patch are larger and more widely spaced. Scutellum: sparse apically, less so on central area. Corium: not on basal patch of exocorium.

Head – Slightly wider than long, apex semi-circular, side margin slightly sinuate just in front of eye. A pair of black spots equispaced along hind margin of head. Lateral lobes (paraclypeus) meet broadly, in front of the apex of the central lobe (clypeus).

Antennae – Slender, yellowish; basal segment hidden under head, at first sight 2nd & 3rd segments appear to be a single long unmarked segment; 4th segment has a broad black band, 5th has apical 2/3rd black.

Rostrum – Yellowish with dusky markings, apex black, reaches hind margin of metasternum.

Pronotum – Very transverse, width about 3 × length.

Scutellum – 'Triangular', longer than wide, apex semi-circular (rather than parabolic) with cream border; sides depressed and slightly sinuate. Basal angles with small, dark, triangular depression and an adjoining cream spot. Short cream streak on base of median line; cream double median lines on hind half of scutellum.

Hemelytra – Corium narrow, laterally only reaches inner edge of connexivum; posteriorly reaches distinctly beyond apex of scutellum; exocorium has a small rectangular white patch at base. Membrane very broadly rounded, brownish with darker round spots.

Legs – Robust, pale with large black spots, apical segment of tarsus black. Tibia with three longitudinal keeled ridges.

Connexivum – Upperside of each segment black with middle third white; underside mostly white, only narrowly and diffusely black at the anterior end of each segment.

Underside – Underside of abdomen has several large dark patches with a metallic red sheen; several across basal segment and one centrally on the 7th segment. Puncturation varies in density and colour. Abdominal spiracles black. The large white patch on the front margin of the pronotum is repeated on the prosternum, and the lateral area behind this bears a large black patch. Mesonotum with a large black patch centrally.

Parameres – Terminal lobe large, broadly triangular with strongly sinuate margins.

Nymphs – in the fifth instar (and fourth to a lesser extent) the markings and shape of head and pronotum resemble those of adults. However, the connexivum markings are diffuse and rounded; the apical tarsal segment is dusky not black, and the antennal markings are diffuse. The abdominal glands are pale, set in two dark oval patches.

Status and habitat of *D. umbraculatus*

Essentially a Mediterranean species, the range of *D. umbraculatus* extends from North Africa northwards to a latitude of about 50°N, (Belgium to SW Russia), and from the Atlantic coast of NW Europe eastwards to the Caucasus region (Aukema & Rieger, 2006). It has only recently extended its range to Belgium (Bracke *et al.*, 2006). In France it is not uncommon south of the Loire but is absent NE of a line from Le Havre to Lyon; it was formerly recorded in Normandy (Derjanschi & Péricart, 2005) and has been recorded from the Channel Isles.

The main host plant is *Galium aparine* ('Goosegrass' or 'Cleavers') but in eastern Europe it is *G. mollugo* ('Hedge Bedstraw'), *G. aparine* being absent. Observations in eastern Europe (Derjanschi & Péricart, op.cit.) indicate one generation a year; the adults hibernating near the host plant and emerging in spring to mate and oviposit on leaves and flowers of *G. mollugo* in the period May–July, the new generation of adults emerge about two months later.

In Belgium *D. umbraculatus* was first recorded on 18th May 2004, on *Galium aparine* in an informal wildlife reserve in the northern suburbs of Brussels (Bracke *et al.*, 2006). Adults were subsequently noted on several dates in 2005: 12th June, 15th July, 9th August and 5th October; in the same year nymphs were seen on 17th July and 9th August. When the hostplant died back in July the bugs became diffcult to find – on 15th July it took an hour to find one! Later in the season green *G. aparine* was again available and the bug was found in considerable numbers, presumably the new generation. In May 2005, following publicity about the initial discovery of the bug, another site was reported, at Roison about 70 km SW of Brussels, again on *G. aparine* (Bracke *et al.*, op.cit.).

Comparing aerial photographs of the Brussels and Perivale sites, using Google Earth, the similarity of the two sites is remarkable. Both are semi-wooded wildlife reserves in the suburbs of a large urban area, and are flanked on one side by a railway complex and on other sides by roads, residential areas and light industry. This suggests the possibility that both records may involve some degree of accidental transportation by road or rail, although this remains speculation. It is interesting to note that independent invertebrate surveys of Little Elms meadow on 14.v.2013 and 9.vii.2013 failed to record the species, despite the use of a suction sampler amongst large stands of *G. aparine* growing along the woodland edge (T. Bantock, pers. comm.).

Other Sciocorini species which might reach the British Isles

The Palaearctic Sciocorini comprises five genera of which two have no European species, so need not concern us further. The other three are two small genera and one very large genus, *Sciocoris*. The small genera, *Dryoderes* and *Menaccarus*, each have one species in western Europe, *M. arenicola* (Scholtz) and *D. umbraculatus*, both are already known from the Channel Islands (LeQuesne, 1984), but not from Britain.

The very large genus is *Sciocoris*, with nearly 60 species, 15 of which are known from 'Western Europe', here defined as Iberia, France, Great Britain, The Low Countries, Switzerland and Scandinavia. Of the 15 species only *S. cursitans* (F.) is

Table 1. Distribution of the 'northern group' of *Sciocoris* species, data from Aukema & Rieger (2006) and Aukema, Rieger & Rabitsch (2013).

Sciocoris spp.	Countries where species is known in W Europe.											
cursitans	PO	SP	FR	SZ	GB	BE	NL	GE	DE	SV	NR	FI
homalonotus	PO	SP	FR	SZ	–	BE	NL	GE	DE	SV	–	–
macrocephalus	PO	SP	FR	SZ	–	–	–	GE	DE	–	–	–
microphthalmus	–	SP	FR	SZ	–	BE	–	GE	–	SV	NR	FI
umbrinus	PO	SP	FR	SZ	–	–	–	GE	–	SV	NR	FI

(PO = Portugal, SP = Spain, FR = France, SZ = Switzerland, GB = Britain, BE = Belgium, NL = The Netherlands, GE = Germany, DE = Denmark, SV = Sweden, NR = Norway, FI = Finland)

Table 2. Identification of the 'northern group' of Sciocorini, male parameres are also useful. (Data mainly based on Derjanschi & Péricart, 2006, and Wachmann *et al.*, 2008)

Species	Length, mm	Habitats & hostplants	Identification notes
Dyroderes: Pronotum very wide, about twice as wide as head (inc eyes), side of pronotum 'semicircular'.			
D. umbraculatus	7.0–8 .0	Thermophile. Dry to moderately humid areas in partial shade on *Galium aparine* or *G. mollugo*; less often *G. verum* in open places.	Large size; white shoulder patches; distinctive pronotum shape (see above)
Sciocoris: s.g. *Sciocoris* – Eyes not stalked, side of head not indented in front of eye. Lateral hind apices of genital capsule simple.			
S. cursitans	4.5–6.0	Thermophile. Warm, dry, sandy or stony ground with low vegetation; e.g. sand dunes or chalk downland. Often in crevices under stones or among plant roots. In England particularly associated with *Teucrium* (Wood Sage), also *Erodium* (Stork's-bill), but not *Sedum*. Possibly *Hieracium pilosella* (Mouse-ear Hawkweed).	Commonest of Sciocorini, quite variable.
Sciocoris: s.g. *Aposciocoris* – Eyes on short 'stalk', head deeply indented just in front of eye. Lateral hind apices of genital capsule directed inwards to a point. Species often confused with one another.			
S. homalonotus	5.9–8.0	Generalist. Diverse lowland & upland sites; on soil and litter on sand, chalk or clay; especially woodland margins. Foodplants possibly grasses – *Poa*, *Bromus* and *Dactylis*.	Large size, often confused with *S. microphthalmus et al.*
S. macrocephalus	5.5–7.8	Thermophile Dry sunny areas on upland slopes and river terraces. Hostplants *Knautia* & *Scabiosa*.	Eye small, on a long tubercle; side of head weakly sinuate between eye and apex.
S. microphthalmus	4.7–6.5	Boreo-alpine, forest clearings & margins (deciduous & mixed); biology poorly known, hosts possibly *Teucrium* and *Thymus*.	Very like *S. umbrinus* and *S. homalonotus*.
S. umbrinus	5.3–6.0	Boreo-alpine, habitats as *S. microphthalmus*: on light soils, sandy or calcareous. Found under *Peucedanum*, *Thymus*, Erica, *et al.* [Sometimes assigned to s.g. *Sciocoris*.]	Genitalia distinctive. Larger eyes than *microphthalmus* and not on a tubercle; longer corium with less rounded apex.
Menaccarus: Fringe of short fine setae along sides of head, pronotum and hemelytra (basally).			
M. arenicola	4.8–6.8	Thermophile. Sparsely vegetated loose sand, coastal and inland dunes and beaches. On grasses, and species of pea family (Fabaceae); nymphs under plants and litter.	Head much wider than long. Fringe of short fine bristles on side margin of head (very short), pronotum and hemelytra (basally). Basal segment of hind tarsus long, at least equal to 2nd + 3rd.

currently known from Britain, being sparsely distributed in southern England. The 15 species includes a 'northern group' of particular interest, being five species that range at least as far north as southern Scandinavia; a 'southern group' of eight species which range no further north than Iberia or southern France; and a 'central group' of two species known in Western Europe only from France and/or Switzerland. Species of the central and southern groups are unlikely to reach Britain in the foreseeable future.

The northern group tolerate a climate similar to that of parts of the British Isles, and therefore are candidates for extending their range to Britain. All five are known from Scandinavia and three are established as far north as Finland, Table 1 summarises the distributions of species of the northern group while Table 2 summarises their habitats and some characters helpful for identification.

The three Finnish species are *S. cursitans* (F.), *S. microphthalmus* Flor and *S. umbrinus* (Wolff), and have been known there for 40 years or more. Of these, the most widespread in Finland is *S. umbrinus*, and this has expanded its Finnish range in recent years. It is now known from 133 10km-squares – the other two species are known from no more than ten squares each (Hemiptera Expert Group, 2013).

The remaining two species of the northern group, *S. homalonotus* Fieber and *S. macrocephalus* Fieber, have rather similar distributions in Western Europe (Table 1), apparently requiring a continental climate. However, in 2011 *S. homalonotus*, a somewhat generalist species, was found breeding in The Netherlands. It was in an area of sheltered calcareous grassland, in a railway cutting in Limburg, in the extreme southeast of the country (Aukema, 2011). In NW Europe more generally it is also known from Denmark and southern Sweden. In much of France and Spain it is widespread, but is absent from the humid northwest. This suggests that it does not tolerate high humidity, so if it were to spread to England the most suitable region would be East Anglia, with its more continental climate.

Conclusions

The recent experience of *D. umbraculatus* in Belgium suggests that the Perivale record might well be expected to be followed by proof of breeding, and further records from elsewhere in the London area.

The climate of the SW peninsula of England seems very suitable for *M. arenicola* so this species could become established here, at least if it could overcome the barrier presented by the wide stretch of sea between the Channel Islands and that part of England.

Hitherto, only one species of *Sciocoris* has been recorded from Britain, consequently when specimens are encountered one is likely to assume automatically that the species is *S. cursitans*. However, on climatic grounds *S. homolonotus* and *S. umbrinus*, at least, might be encountered here in the not too distant future. So all individuals of this genus should be subjected to very careful scrutiny.

Acknowledgements

Various assistance provided by Berend Aukema, Armand Matocq, Jean-Claude Streito and Sheila Brooke is gratefully acknowledged.

References

Aukema, B., 2011. Nieuwe en interessante Nederlandse wantzen, V (Hem.:Het.). Nederlandse Faunistische Mededelingen, 36.

Aukema, B. & Rieger, C., 2006. Catalogue of the Heteroptera of the Palaearctic region, vol.5, The Netherlands Entomological Society.
Aukema, B., Rieger, C., & Rabitsch, W., 2013. Catalogue of the Heteroptera of the Palaearctic region, vol. 6, The Netherlands Entomological Society.
Bracke, A., Coppée, J.-C., Doornaert, A., & Bart Hanssens, B., 2006. Note sur la découverte en Belgique de *Dyroderes umbraculatus* (Fabricius, 1775) (Heteroptera : Pentatomidae) dans un espace vert de la Région bruxelloise. *Notes fauniques de Gembloux*, **59** (1), Communications brèves.
Derjanschi, V, & Péricart, J., 2005. Hemiptéres Pentatomoidea Euro-Mediterranéens, vol.1, *Faune de France, no. 90*, Féderation Française des Sociétés de Sciences Naturelles.
Hawkins, R. D., 2003. *Shieldbugs of Surrey*. Surrey Wildlife Trust, Woking.
Hemiptera Expert Group [Finland], Nov. 2003: http://www2.sci.utu.fi/projects/biologia/elainmuseo/hemi/het/ludemaps.htm
LeQuesne, W. J., 1984, Heteroptera of the Channel Islands. Supplement to Heteroptera Study Group Newsletter no. 3 – May 1984
Kirby, P., 1992. *A review of the scarce and threatened Hemiptera of Great Britain*. JNCC, Peterborough.
Southwood, T. R. E. & Leston, D., 1959. *Land & Water Bugs of the British Isles*. Warne, London.
Wachmann, E., Melber, A., & Deckert, J., 2008. Wanzen, Band 4, Pentatomorpha II, Die Tierwelt Deutschlands, Goecke & Evers, Keltern.

SHORT COMMUNICATIONS

A first record of Pale Pinion *Lithophane hepatica* (Clerck) (Lepidoptera: Noctuidae) on Mull, Argyll, Scotland. – On 30.iv.2013 one individual of *Lithophane hepatica* (Clerck) was attracted to actinic light at Lochbuie, Mull, Argyll, Scotland, (NM6224). A photograph of the moth was sent to Alan Skeates (VC103 recorder and Butterfly Conservation volunteer) and he advised us that this was the first record for Mull and the Mid Ebudes (VC103). The moth is on the wing in October and November, overwinters and reappears in spring. Emmet & Heath (1992) give the northern limit of this species as northern England but this is long out of date. Waring & Townsend (2009) include southern Scotland and Hill *et al.* (2010) provide a distribution map of *L. hepatica* for the British Isles that shows the range extension into southern Scotland. A search of the World Wide Web indicates that records are increasing at least as far north as Stirling. At the time of capture it is possible that the Mull record was the most northerly known in Great Britain.

We are grateful to Alan Skeates for arranging the loan of traps from Butterfly Conservation and for encouraging us to record all of our moth and butterfly sightings on Mull during our holiday. Butterfly conservation and Scottish Natural Heritage funded the purchase of the moth traps. – M. T. and S. A. JENNINGS, 206 Lower Higham Road, Gravesend, Kent, DA12 2NN.

REFERENCES

Emmet, A. M. & Heath, J. 1992. *The Moths and Butterflies of Great Britain and Ireland* 7(2). Harley Books. 398pp.
Hill, L., Randle, Z., Fox, R. & Parsons, M. 2010. *Provisional atlas of the UK's Larger Moths*. Butterfly Conservation, Wareham, Dorset.
Waring, P. & Townsend, M. 2009. *Field Guide to the Moths of Great Britain and Ireland*. British Wildlife Publishing. 432pp.

Photographic record of a mermithid parasitoid (Nematoidea: Mermithidae) of a sawfly larva. – Although only infrequently, I have several times reared the postparasitic larval stage of undetermined mermithids from Lepidoptera caterpillars, especially those collected in damp environments. However, I had never noticed the presence of the mermithid in the host until the postparasitic larval stage had erupted. I was therefore interested to find a sawfly larva at Ounans in the French Department of Jura on 14.vii.2013 in which the growing parasitoid was clearly visible (Fig. 1), occupying the haemocoel in general over more or less the whole length of the host in several loops. The host would presumably have been penetrated by a free-living preparasitic larva, but in some taxa the life cycle differs in that eggs of the nematode are ingested by the host: in either event, the parasitoid phase migrates to the host's haemocoel and feeds on its haemolymph. Information on the biology of Mermithidae is give by Welch (1963) and Kaiser (1991). In the present case the postparasitic larva (Fig. 2) erupted from the host (which, as usual, died over the next day or two) after both had continued developing for a further six days after the picture (Fig. 1) was taken. The sawfly larva was found feeding on purple loosestrife, *Lythrum salicaria* L., growing near a pond, and has kindly been identified (from Fig. 1) as probably *Ametastegia glabrata* (Fallén) (Hymenoptera: Tenthredinidae) by Andrew D. Liston. I have the mermithid in ethanol if anyone would be interested in trying to determine it (perhaps by DNA, as I presume it is still pre-adult). I thank Dr. Andreas Schmidt-Rhaesa, Curator Lower Invertebrates, Zoological Museum, Hamburg, for the useful references. – MARK R. SHAW, National Museums of Scotland, Chambers Street, Edinburgh, EH1 1JF, U.K. markshaw@xenarcha.com

REFERENCES

Kaiser, H. 1991. Terrestrial and semiterrestrial Mermithidae, pp. 899–965 in Nickle, W. R. (ed.) *Manual of Agricultural Nematology*, Marcel Dekker, Inc, New York.

Welch, H. E. 1963. Nematode infections, pp. 363–392 in Steinhaus, E. A. (ed.) *Insect Pathology Vol. 2*, Academic Press, New York.

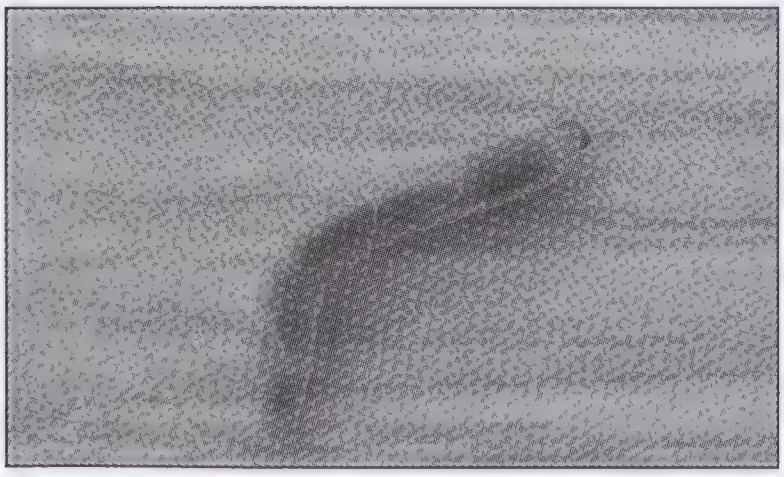

Fig. 1. Mermithid parasitoid looped in the larval haemocoel of the sawfly ?*Ametastegia glabrata*.

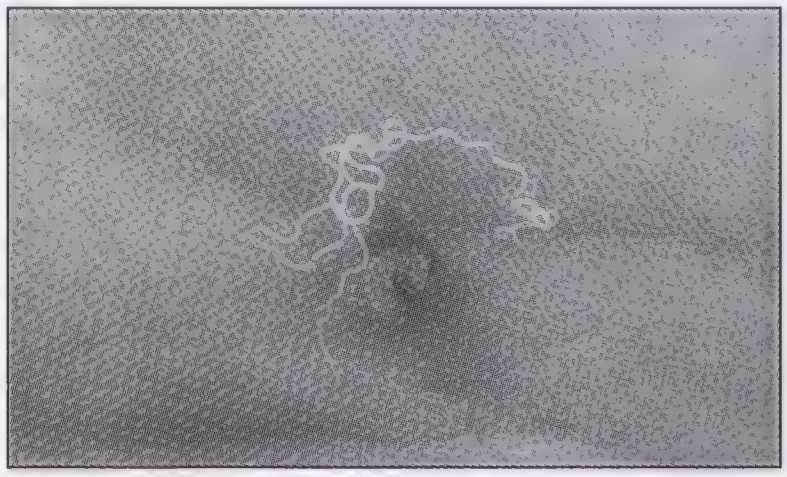

Fig. 2. Postparasitic stage of the mermithid just after eruption from the host.

FIRST INCURSION OF MANUKA FELT SCALE *ACANTHOCOCCUS MARIANNAE* IN BRITAIN (HEMIPTERA: ERIOCOCCIDAE)

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ABSTRACT

In the autumn of 2008 a large infestation of an undescribed species of felt scale (Hemiptera: Eriococcidae) was observed on a single *Leptospermum* sp. plant growing outdoors in a private garden in Essex, England. The insect was subsequently described in 2010 as *Acanthococcus mariannae* Pellizzari from specimens collected from Manuka plants (*Leptospermum scoparium*) in Italy and France (Corsica). This is the first confirmed incursion of the Manuka Felt Scale in Britain. The biology, geographical distribution and economic importance of this scale are discussed.

INTRODUCTION

A single *Leptospermum* sp. (Myrtaceae) plant growing outdoors in a private garden with a southern aspect in Billericay, Essex, England (TQ6795), was found to be covered with small, whitish, felt-like patches during the autumn of 2008 (Plate 3, Fig. 1). A sample was taken by the owner on the 3rd March 2009 and submitted to The Royal Horticultural Society and subsequently forwarded to The Food and Environment Research Agency (FERA), where it was identified as a species of felt scale *Eriococcus* sp. (Hemiptera: Eriococcidae). The specimens did not key out satisfactorily with the pertinent literature (e.g., Hoy (1959), Williams (1985) and other references cited below) and were concluded to represent an undescribed species. Unbeknown to the authors the same species of felt scale had been collected in 2004 from potted Manuka plants (*Leptospermum scoparium* J. R. Forst & G. Forst.) in Genova, Italy, and in 2006 from Manuka plants at two localities in Corsica (France). It was subsequently described from French and Italian specimens under the name *Acanthococcus mariannae* Pellizzari (Pellizzari & Germain, 2010). The population in Essex represents the first confirmed incursion of this species in Britain. However, in March 2000 a *Callistemon* sp. (Myrtaceae) plant imported from Australia to the National Botanic Gardens of Wales, Llanarthney, Carmarthen, was found by the Plant Health and Seeds Inspectorate to host a small population of exotic eriococcids. The majority of specimens were immature and only a single adult female was slide mounted. Whilst all the visible characters of the adult specimen were morphologically consistent with *A. mariannae* it was damaged and the identity could not be confirmed.

The purpose of this communication is to report the first known incursion (an isolated population of a pest recently detected in an area, not known to be established, but expected to survive for the immediate future (FAO, 2012)) of *A. mariannae* in Britain and to assess any potential impact in Britain. Slide mounted specimens of *A. mariannae* are deposited at FERA.

Nomenclature

Acanthococcus mariannae Pellizzari in Pellizzari & Germain, 2010
Synonym: _Uhleria?_ nr. _araucaria_ Kozár, 2009. Nomen nudum.

The generic placement of *A. mariannae* is contentious. Recent keys to eriococcid genera assign this species either to the genus *Acanthococcus* (Kozár & Konczné Benedicty, 2008; Hodgson & Miller, 2010), *Eriococcus* (Hodgson *et al.*, 2004; Henderson, 2007) or *Uhleria* (Pellizzari & Kozár, 2011). The species is retained here in the genus *Acanthococcus* until the higher taxonomy has been settled, although it may be re-assigned to the genus *Uhleria* (Pellizzari & Kozár, 2011). The current status of eriococcid taxonomy has recently been reviewed by Kozár & Konczné Benedicty (2008), Kozár (2009), Kozár *et al.* (2009) and Hodgson & Miller (2010).

The common name 'Manuka Felt Scale' is proposed here for use in Britain, after what appears to be its preferred host.

Detection and identification

The following description is based on observations made of the British samples. Adult females are elongate oval, grey-brown, and their abdomen shows distinct segmentation. Females usually settle on the upper leaf surfaces to feed but also occur on the lower leaf surfaces, in leaf axils and on apical twigs of the host plant (Plate 3, Figs 1–3). Adult females become enclosed in a felted, whitish, convex egg sac, which is open at the anal end to allow the first instars to escape. The male test (felt-like protective wax cover) is oval, whitish, and usually found on the lower surface of the foliage (Plate 3, Fig. 4). The adult males were not observed but in common with other eriococcid species they are likely to resemble small flies with a single pair of wings. The female covers were larger (3.0–3.25 mm long) than those of the male (1.75–2.0 mm). The female nymphs resemble the adults but are not enclosed in a felted cover (Plate 3, Fig. 5).

Acanthococcus mariannae is readily distinguished from all other eriococcids currently found in Britain by the combination of: dorsal spinose setae much shorter than the marginal spinose setae; anal lobe with strong sub-apical setae; and the presence of very large, dorsal macrotubular ducts. It is the only eriococcid species known to feed on *Leptospermum* recorded in Britain. Pellizzari & Germain (2010) provide excellent illustrations, photos and a detailed morphological description of this species.

Host range and biology

Acanthococcus mariannae feeds on *Leptospermum* spp. and possibly *Callistemon* sp. (Myrtaceae). However, as the species has only recently been described, its host range is unclear. The biology has not been studied in detail but it is assumed to be sexually reproductive. The sex ratio observed in the Essex population was 2 females: 1 male (based on counting the male tests). Females collected from Essex laid an average of 121 eggs (range 58–192, $n = 8$). They appeared to have overwintered in the UK in the egg stage as the majority of live specimens observed in March were eggs. Pellizzari & Germain (2010) reported that it is likely to be multivoltine.

Geographical distribution

Acanthococcus mariannae is probably native to Australia or New Zealand although it has not been collected from either country. It has become established

in France (Corsica) and northern Italy (Genoa) (Pellizzari & Germain, 2010; Pellizzari & Kozár, 2011) and the first known incursion in Britain is reported here.

Economic importance

Large populations may reduce host vigour and lower the value of ornamental plants. A large population of *A. mariannae* is reported to have killed a potted *Leptospermum* plant in Italy (Pellizzari & Germain, 2010). Many *Leptospermum* cultivars are hardy (Cubey, 2013) and can be grown out of doors in sheltered places in southern Britain, but will be damaged by hard frosts. The plants are widely available in the UK and important ornamental garden plants in the south and west of the British Isles (J. Armitage, pers. comm, 2013). There is also a commercial Manuka plantation in Britain located in Cornwall. It produces Manuka honey and Manuka flower herbal tisane ('English tea') for the health food market. It is not anticipated that *A. mariannae* will become a serious economic pest in Britain due to its host specificity (*Leptospermum*, and possibly other Myrtaceae), low natural dispersal potential (adult females are wingless and the main natural dispersal stage are the first instar nymphs), and the climate may be unsuitable for the scale populations to reach damaging levels. There is, however, a high degree of uncertainty regarding its impact due to its biology being largely unknown. It may have a low economic impact on ornamental *Leptospermum*, and on Manuka honey and infusion production in the UK.

Discussion

This is the first published incursion of *A. mariannae* in Britain. The status of the population of Manuka Felt Scale in Essex is uncertain as it has not been monitored. The biology of this species is largely unknown but its host range may be restricted to *Leptospermum* spp. and possibly *Callistemon* spp. It appears to be multivoltine (at least in the Mediterranean). The free movement of plants within the European Union means that there is a continual risk of *A. mariannae* being introduced on ornamental *Leptospermum* plants imported from France and Italy. It is unlikely to have a significant economic or environmental impact in Britain although it has the potential to have a low impact on ornamental *Leptospermum*, and on Manuka honey and infusion production.

Acanthococcus mariannae is the eleventh species of scale insect found breeding in Britain that is suspected to have originated in Australasia: *Balanococcus diminutus* (Leonardi), *Chionaspis xanthorrhoeae* Fuller, *Fusilaspis phymatodidis* (Maskell), *Icerya purchasi* (Maskell), *Leucaspis podocarpi* (Green), *Parlatoria pittospori* Maskell, *Pseudococcus calceolariae* (Maskell), *Pseudococcus longispinus* (Targioni Tozzetti), *Symeria pyriformis* (Maskell) and *Rhizoecus dianthi* Green (Malumphy & Halstead, 2012).

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References

Cubey, J. 2013. *RHS Plant Finder 2013*. Royal Horticultural Society. 960 pp.

F.A.O., 2012. Glossary of phytosanitary terms. *International Standards for Phytosanitary Measures* **5**: 1–36.

Henderson, R. C. 2007. Three new genera and six new species of felt scales (Hemiptera: Coccoidea: Eriococcidae) from mountain habitats in New Zealand. *Zootaxa* **1449**: 1–29.
Hodgson, C. J. & Miller, D. R. 2010. A Review of the Eriococcid Genera (Hemiptera: Sternorrhyncha: Coccoidea) of South America. *Zootaxa* **2459**: 1–101.
Hodgson, C. J., Goncalves, S. J. M. R., Miller, D. R. & Isaias, R. M. S. 2004. A key to genera of Eriococcidae (Hemiptera: Coccoidea) from the Neotropical region and a revision of *Pseudotectococcus* Hempel (Eriococcidae), a gall inducing scale insect genus from Brazil, with a description of a new species. *Lundiana* **5**: 51–72.
Hoy, J. M. 1959. Species of *Eriococcus* Targ. (Homoptera, Coccoidea) associated with the genus *Leptospermum* Forst. in southeastern Australia and Tasmania. *New Zealand Journal of Science* **2**: 1–34.
Kozár, F. 2009. Zoogeographical analysis and status of knowledge of the Eriococcidae (Hemiptera), with a World list of species. (Summary In Italian). *Bollettino di Zoologia Agraria e di Bachicoltura (Milano)* (Ser. II) **41**: 87–121.
Kozár, F. & Konczné Benedicty, Z. 2008. Description of three new genera, five new species and some additional data on the taxonomy and distribution of Neotropic Eriococcidae (Homoptera Coccoidea Eriococcidae). *Bollettino di Zoologia Agraria e di Bachicoltura* (Ser. II) **40**: 1–8.
Kozár, F., Williams, D. J. & Konczné Benedicty, Z. 2009. A new genus and four new species of the scale insect family Eriococcidae (Hemiptera: Coccoidea) from the Austro-Oriental Region. *Zootaxa* **1979**: 1–15.
Malumphy, C. & Halstead, A.J. 2012. First Incursions in Europe of four Australasian Species of Armoured Scale Insect (Hemiptera: Diaspididae). *British Journal of Entomology and Natural History* **25**: 193–198.
Pellizzari, G. & Germain, J-F. 2010. A new species of *Acanthococcus* (Hemiptera, Coccoidea, Eriococcidae) on *Leptospermum scoparium* (Myrtaceae) from Italy and France. *Zootaxa* **2543**: 51–63.
Pellizzari, G. & Kozár, F. 2011. A new species of *Greenisca* and two new species of *Ovaticoccus* from Italy (Hemiptera Coccoidea Eriococcidae), with a key to European genera of Eriococcidae. *Zootaxa* **3090**: 57–68.
Williams, D. J. 1985. The British and some other European Eriococcidae (Homoptera: Coccoidea). *Bulletin of the British Museum (Natural History) Entomology Ser.* **51**: 347–393.

SHORT COMMUNICATIONS

***Hydroptila angulata* and *Oxyethira flavicornis* (Trichoptera: Hydroptilidae), caddisflies new to Northern Ireland.** – KGMB has been identifying Irish Microlepidoptera sent to him by collectors from all over the island. Three pinned hydroptilids were found amongst this material and the specimens were given to the senior author for determination. The specimens were cleared in 10% KOH and determined using Marshall (1978) and Barnard & Ross (2012). The hydroptilid fauna of Northern Ireland is poorly known compared with the rest of Ireland. Two species new to Northern Ireland were identified and the details are given here.

Hydroptila angulata Mosely
Armagh: Aughinlig near Moy (Irish grid reference H8753), MV light-trap 2♀♀ 26.vii.2008, K. Murphy. The site is near a tributary of the River Blackwater from which the specimens probably originated. There are published Irish records from Counties Galway and Kerry (O'Connor, 1987).

Oxyethira flavicornis (Pictet)
Fermanagh: Derryvore Townland near Crom (H3423), MV light-trap ♂ 28.viii.2009, K. Murphy. The site lies on a small peninsula in Upper Lough Erne from which the

specimen undoubtedly originated. The species is known to be widespread in the rest of Ireland (O'Connor, 1987).

We are very grateful to Kenny Murphy for the specimens which will be deposited in the National Museum of Ireland. – J. P. O'Connor, National Museum of Ireland, Kildare Street, Dublin 2, Ireland (email: joconnor@museum.ie) & K. G. M. Bond, Department of Zoology and Animal Ecology, School of BEES, University College Cork, Distillery Fields, North Mall, Cork, Ireland (email k.bond@ucc.ie).

References

Barnard, P. & Ross, E. 2012. The adult Trichoptera (caddisflies) of Britain and Ireland. *Handbooks for the Identification of British Insects* **1**(17): i–iv, 1–192.

Marshall, J. E. 1978. Trichoptera Hydroptilidae. *Handbooks for the Identification of British Insects* **1(14a)**: 1–30.

O'Connor, J. P. 1987. A review of the Irish Trichoptera, pp. 73–77. *In* Bournaud, M. & Tachet, H. (eds) *Proceedings of the 5th International Symposium on Trichoptera.* Dr W. Junk Publishers, Dordrecht.

All four *Notonecta* L. (Hemiptera: Notonectidae) in one pool, and *Aquarius paludum* (F.) (Hemiptera: Gerridae) too. – On 5.ix.2009, I visited Wildmoor Heath, Crowthorne, Berkshire with the specific intention of doing some water netting. I had a particular peaty pool in mind (National Grid Reference SU840627), about five or six metres in diameter, which I had eyed with interest on several previous visits to the heath, but had always been too busy with other chores to investigate. There seemed to be a potentially good population of water bugs, judging by the number of back-swimmers I had seen under the surface film, a suspicion quickly confirmed by my catch on the day, which included twelve examples of *Notonecta*, representing all four British species: two specimens each of *N. viridis* Delcourt, *N. glauca* L. and *N. maculata* F., and six specimens of *N. obliqua* Thunberg. The collection of a complete set of the British species of this genus in a single place is stated as being rare by Huxley (2003), and the former national recorders, Sheila Brooke and Bernard Nau, inform me that this is their experience also.

The commonest and most widespread of the four species is *N. glauca*, which Southwood and Leston (1959) states can be found in most ponds, canals and ditches in Britain. *Notonecta viridis*, formerly *N. marmorea* F., is associated with coastal brackish waters, but often occurs with *N. glauca* inland. The remaining two species are perhaps more particular. *Notonecta maculata* is commonly found in artificial situations (such as concrete tanks and cow troughs) and ponds with stony bottoms, where it will lay its eggs on the hard substrate. In contrast, *N. obliqua* is a denizen of acid or bog pools, like the water body where I took my *Notonecta* on this occasion, an association that probably accounts for its predominance amongst my specimens.

These preferenda suggest that, of the four species, *N. maculata* is probably the most surprising find at Wildmoor Heath, although it is known from heathland (Huxley, *op. cit.*). The preferred water conditions for the *Notonecta* are not absolute, and in terms of organic content, conductivity and pH, the tolerated water conditions for the four species do overlap (Savage, 1989), making the coexistence of all four species in one place possible, if unlikely. It is possible that one or more of the species I found were not breeding in the pool, but were chance, temporary immigrants. No nymphs of any backswimmer were taken.

It would, perhaps, be of ecological interest if the presence of all four species in my peaty pool was because there exists a unique combination of conditions in this particular habitat which all could tolerate, in spite of the differences in their preferenda. However, there is no evidence for this in the British entomological literature. I have found three other reported instances of a complete set of *Notonecta* being found in one place, none of which are from peaty pools. Brown (1940) took all four from a pond in Hertford, created by damming a stream, Brown (1942) found the set in a pond in the Cotswolds, near Cheltenham, at an elevation of 230m, and Massee (1946) took them all from a shallow ballast pit near New Romney, Kent. Consequently, it would appear that the feat of finding all four species in one place is akin to finding a four-leaved clover, more of a curiosity than something of important ecological significance.

Whilst I was working the pool, I made another interesting find: a singleton of *Aquarius paludum* (F.) (Gerridae). This large pond skater made its entrance by striding towards the centre of the pool from its lair amongst the vegetation along the edge, 2m from where I was standing, and was eagerly captured. Kirby (1992) designates this bug as Notable B, commenting that the animal is probably under-recorded, owing to it being fast-moving and preferring large water bodies, where it often resides well away from the bank. Close examination is necessary to distinguish this species from the similar *Aquarius najas* De Geer. Obviously, in the small pool at Wildmoor Heath there was nowhere it could hide out of reach from my net. I took six more specimens of this bug later in the same month at three sites in Oxfordshire. On 13.ix.2009, I found an individual on a lake near Stanton Harcourt (SP398054), and on 18.ix.2009, I captured four, one on the River Thames at Day's Lock (SU570938) and three on Thrupp Lake, Radley (Watsonian Berkshire, SU520974). A further specimen was taken on Thrupp Lake on 22.viii.2009. – R. P. Ryan, 38 St John Street, Oxford, OX1 2LH (email: *RobRyanBugs@gmail.com*).

References

Brown, E. S. 1940. All four British species of *Notonecta* (Hemipt.) taken simultaneously from one pond. *Entomologist's Monthly Magazine* **76**: 44.

Brown, E. S. 1942. A further instance of all four British species of *Notonecta* (Hem., Notonectidae) occurring together in the same habitat. *Entomologist's Monthly Magazine* **78**: 120.

Huxley, T. 2003. *Provisional atlas of the British aquatic bugs (Hemiptera, Heteroptera)*, Biological Records Centre, Huntingdon.

Kirby, P. 1992. *A review of the scarce and threatened Hemiptera of Great Britain. UK Nature Conservation No 2*. Joint Nature Conservation Committee, Peterborough.

Massee, A. M. 1946. *Notonecta obliqua* Gallen (Hem., Notonectidae) and allied species recorded in Kent. *Entomologist's Monthly Magazine* **82**: 301.

Savage, A. A. 1989. *Adults of the British aquatic Hemiptera Heteroptera: a key with ecological notes*, Freshwater Biological Association, Ambleside.

Southwood, T. R. E. & Leston, D. 1959. *The land and water bugs of the British Isles*, Frederick Warne & Co. Ltd, London.

PITFALL TRAP SURVEYS OF BEETLES IN LANGLEY WOOD NATIONAL NATURE RESERVE, WILTSHIRE

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ABSTRACT

The results of two, year-long pitfall trapping exercises for beetles in the Bishops Wood and Outwood areas of Langley Wood National Nature Reserve, south-east of Salisbury in Wiltshire, between 2004 and 2007 are listed and dates given for the first and last captures of each species. In all 42,161 beetles were trapped representing 218 species in Bishops Wood, of which 20 were either rare or nationally notable, and 115 in Outwood, of which eight were nationally notable. The rare species included the RDB *Leiodes lucens* (Fairmaire), *Hylis olexai* (Palm), *Microrhagus pygmaeus* (F.), *Lycoperdina bovistae* (F.), and *Ochrosis ventralis* (Illiger). The trapping of almost 20,000 *Anoplotrupes stercorosus* (Scriba) was a particular feature of the Outwood survey and hypotheses are suggested to explain the huge number. The dung beetle *Typhaeus typhoeus* (L.) previously thought to be an autumn and spring insect was shown to be most active during the winter months. It was anticipated that the number of species trapped would be similar to those recorded from the New Forest to which Langley is connected by almost continuous woodland, but this was not the case. What was very surprising was that the Langley numbers were very similar to those recorded in similar trapping exercises on the nearby chalk grassland at Wylye and Parsonage Downs.

INTRODUCTION

Langley Wood National Nature Reserve is a 214 hectare ancient woodland on acid clays, locally overlain by sands and gravels, situated on the north eastern edge of the New Forest approximately 10 miles south east of Salisbury (SU 21 & 22). Although mainly oak-dominated high forest there is a wide range of other tree species present including birch, lime, alder and some beech. Most of the site is managed under a minimum intervention regime. Unlike the New Forest it has a history of only light grazing by livestock and none has occurred in the last forty years. At the same time there has been a growth in the number of deer and five species are now known to be present: red, roe, fallow, muntjac and sika.

In reviewing the findings of three experiments involving the interaction of deer and invertebrates conducted in different woodland ecosystems over twenty five years Stewart (2001) concluded 'they all leave no doubt that grazing and browsing by large mammalian herbivores can have definite and profound effects on woodland invertebrate populations and community composition'. Whilst over grazing can cause considerable damage, some grazing to retain an open structure which lets in light and raises temperatures is very advantageous, particularly for beetles which include many rare and notable species in this category.

In 2004 it was a long-term objective of English Nature to re-instate wood pasture at Langley by grazing cattle in part of the minimum intervention area. To assess the practicalities of this proposal and to gain increased knowledge of the impact of deer and cattle on the ground flora and fauna, an initial baseline pitfall trapping exercise was conducted in the Bishops Wood area to map the beetle populations before the introduction of the cattle.

In 2006–2007 a second, smaller survey was carried out in Outwood, an area to the north of Bishops Wood, for comparative purposes.

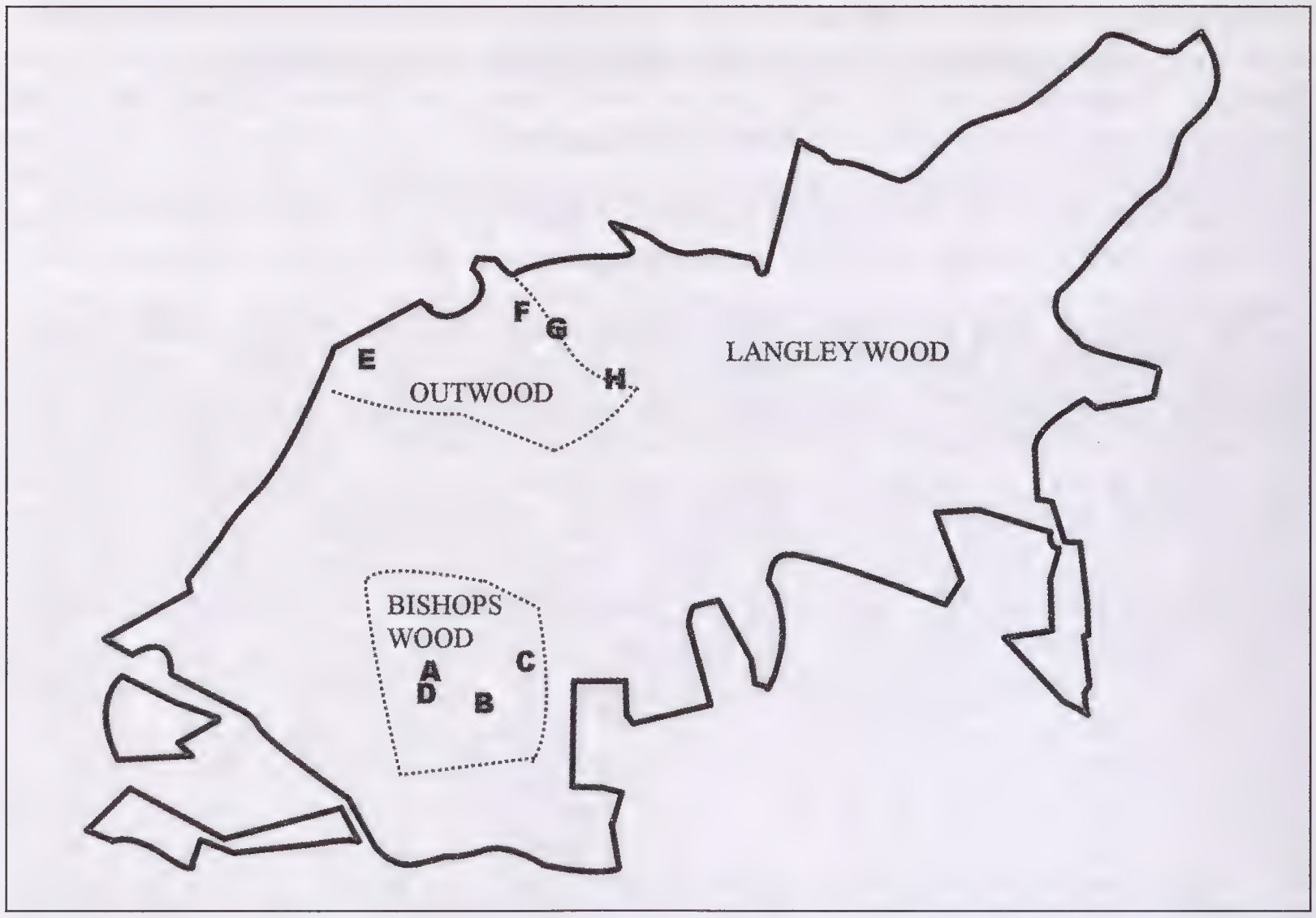

Figure 1. Map of Langley Wood NNR, Wiltshire showing the locations of the trap lines A–D in Bishops Wood and E–H in Outwood.

Methods

The Bishops Wood survey involved three lines of nine pitfall traps set up according to the Newcastle University Pitfall Protocol (Luff, 1996) in each of four areas (Fig. 1, A–D, Plate 4, Figs 1 & 2) Polypropylene pots of diameter (top) 75mm and depth 107mm were used set into the ground at 2m intervals so that their rims were slightly below the surface. Wire mesh ('chicken wire') of 2.5cm diameter was placed over each to exclude small mammals. The traps were then filled to a depth of 1cm with a solution of neat ethylene glycol (Halfords neat blue anti-freeze) and posts to mark the locations of the rows were placed at each end. The traps were emptied approximately every three weeks for a year and the contents of each row placed into a single marked container. A wire tea strainer of mesh size 1mm was found useful to facilitate emptying. The ethylene glycol was re-used whenever dilution by rainwater did not prevent it. Pots found to have been lifted out of the ground by pressure of water from underneath were replaced at the time of the next visit. The dates of emptying the traps, which were put in place on 1 April 2004, were: 22 April, 14 May, 3 June, 25 June, 16 July, 6 August, 27 August, 17 September, 8 October, 29 October, 19 November, 10 December, 31 December 2004, and 21 January 11 February, 3 March, 24 March 2005.

The same methods were used in the second survey in Outwood but confined to single rows of nine pots each in the four different areas (Fig. 1, E–H, Plate 4, Figs. 3 & 4). The dates of emptying the traps, which were put in place on 18 July 2006, were: 5 August, 25 August, 15 September, 6 October, 26 October, 17 November, 8 December 2006, and 5 January, 22 January, 20 February, 24 March, 25 April, 6 June, 2 July 2007.

Figure 2. Pot invaded by *Anoplotrupes stercorosus* in Outwood, Wiltshire, 2004.

The beetles were identified using a Wild/Leica M8 stereoscopic microscope in conjunction with books and a reference collection. Dissections of genitalia, mounted in Euparol, were examined under an Olympus BH-2 compound microscope with phase contrast. Some Leiodidae were sent to Jonathan Cooter for determination.

In compiling the bar charts illustrating the times of collection of the specimens and species, the choice of which species to include in the 'ground dwelling' category is the author's and is open to debate because many species occupy both niches at different stages in their life cycle, e.g. the 'arboreal' weevil *Strophosoma melanogrammum* (Forster) which was found commonly in the traps.

Results

The list of Coleoptera species with numbers of specimens trapped in the two woods at Langley National Nature Reserve, Wiltshire, between 2004 and 2007 with dates of the first and last records are given in the Appendix.

In total 42,157 beetles were trapped: 11,750 representing 218 species in Bishops Wood and 30,407 representing 142 species in Outwood. The dominant species in the former were the carabids *Abax parallelipipedus* (Piller & Mitterpacher) (2,086 specimens) and *Nebria brevicollis* (F.) (2,088), together accounting for 35.4% of the total, and in Outwood the geotrupid *Anoplotrupes stercorosus* (Scriba) (19,793) accounting for 65.1% of the total. Hand sampling using a sieve and tray in all the stands indicated the presence of very small (1mm or less) beetles (Ptiliidae, Staphylinidae, etc) living at ground level which were rarely picked up in the traps. It is likely that these beetles constitute a large proportion of the ground fauna in terms of individuals if not in terms of species.

Although the intention was to gather information primarily about the ground dwelling species (Carabidae), a large number of arboreal and other beetles were also collected. Many presumably fell into the traps from the canopy above, or were blown or washed in by rain and/or surface water. Others, such as the carrion beetles, were undoubtedly attracted by the presence of small dead animals drowned in the traps, and the dung beetles by the presence of their food source in the immediate neighbourhood.

In several months the huge quantity of *A. stercorosus* trapped at Outwood caused problems with the traps. Their numbers in each pot were sufficient to act as a physical barrier to other insects falling in and/or they mined the ground around the traps to such an extent that access was made difficult for other species (Fig. 2). The high numbers of species recorded on 5 August 2006 before disturbance to the surrounding ground appears to confirm the latter.

The numbers of species and individuals in three categories (Carabidae, all species and all ground-dwelling species including Carabidae, see Methods above) recorded on each collection date in Bishops Wood are shown in Figs 3 and 4.

The results indicated that the period 14 May–25 June 2004 was the peak period for both individuals and species and 31 December 2004–3 March 2005 the lowest. There was a second but less substantial peak later in the year from 27 August 2004–8th October 2004.

Discussion

General

The number of specimens recorded in the Outwood survey was much higher than that recorded in the earlier Bishops Wood survey but the number of species was much lower (143 compared with 218). The comparisons were particularly noticeable in the ground beetles (27 compared with 48) and the weevils (9 compared with 25). Those species recorded with high numbers of individuals were the common ones as would be expected. Without making any compensation for the lower number of traps in Outwood 4678 *Nebria brevicollis* (F.) were recorded there compared with 2088 in Bishops Wood; 236 *Philonthus decorus* (Gravenhorst) compared with 26; 985 *Agriotes pallidulus* (Illiger) compared with 119; and 230 *S. melanogrammum* compared with 52. At the same time, however, the number of the common curculionids *Barypeithes araneiformis* (Schrank) was much lower in Outwood than in Bishops Wood (12 compared with 132) and, surprisingly, *B. pellucidus* (Boheman) was not recorded at all, although 533 specimens were found in Bishops Wood. These are small, wingless, ground dwelling species with fused elytra whose larvae feed on plant roots. Little is known about the biology and presumably an appropriate food source was present in one area and not the other.

The ground layer at Outwood was more heavily shaded than at Bishops Wood and ambient temperatures presumably lower which may partly explain the difference in species richness. Another explanation involves the relative ages of the two areas. The carabid *A. parallelepipedus* was recorded in large numbers in both but the number at Bishops Wood (2086) was almost double that at Outwood (1141). This is relevant in view of Assmann's (1999) findings that this species is present in significantly larger numbers in ancient, rather than more recent woodland in the lowlands of north-west Germany.

Given the proximity of Langley to the New Forest and that woodland stretches almost continuously between the two areas, it was anticipated that the surveys would help to show that a similar number of species were present in both areas, but this was

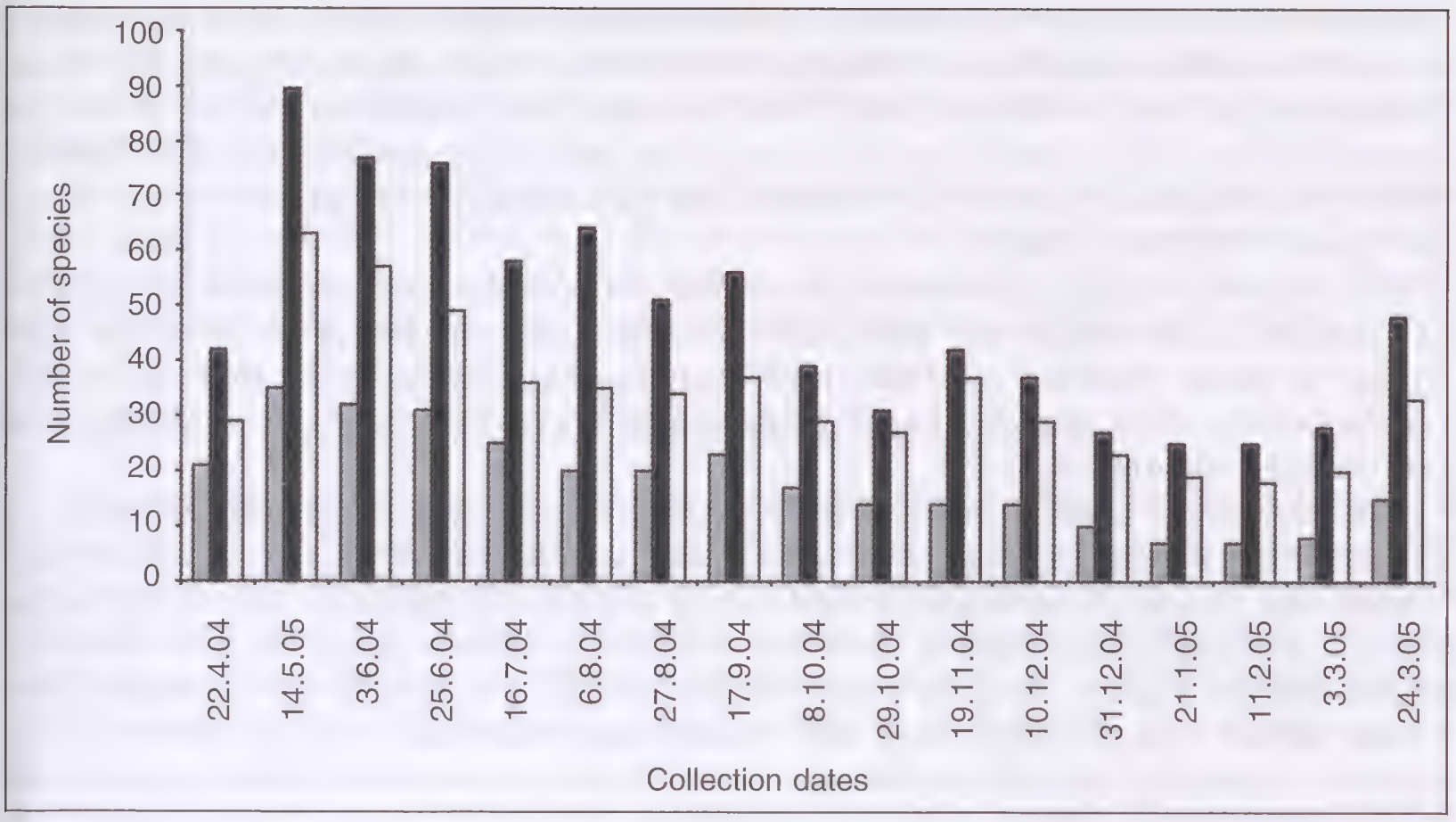

Figure 3. Numbers of beetle species recorded in pitfall traps in Bishops Wood, Wiltshire, April 2004–March 2005. Light grey = Carabidae. Black = all species. White = all ground dwelling species including Carabidae.

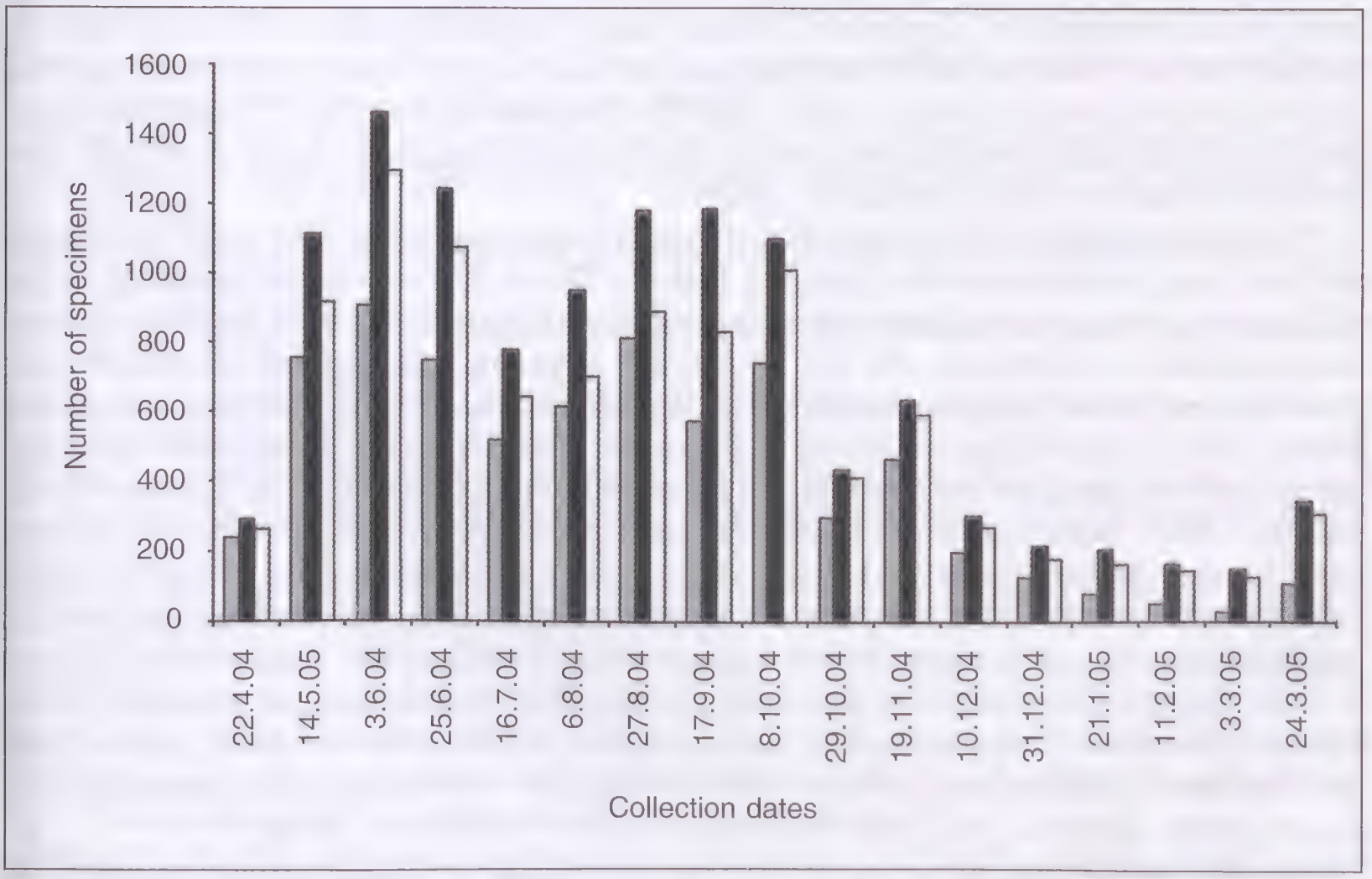

Figure 4. Total numbers of beetle specimens in pitfall traps in Bishops Wood, Wiltshire, April 2004–March 2005. Light grey = Carabidae. Black = all species. White = all ground dwelling species including Carabidae.

not the case particularly in regard to rare and notable species which have been found in much smaller numbers at Langley. Interestingly the Langley figures for these species are not very different from those recorded for Savernake Forest in the far north of the county, which was also at one time part of the same chain of woodland (Darby & Alexander, 2004). The reasons for this dramatic difference are not clear and deserve further research.

The relative paucity of species both in terms of common, rare and notable species at Langley is also surprising when one considers that the numbers there are very similar to those recorded in other pitfall trapping exercises with the same protocols on the nearby chalk grassland at Parsonage and Wylye Downs (Darby, 2009(a) and unpublished information).

The Saproxylic Quality Index (Fowles, Alexander & Key, 1999) and the Index of Ecological Continuity (Alexander, 2004) have established criteria for qualitatively 'classifying' pasture woodland sites according to the composition of saproxylic beetle species. Although these indices involve wood decay species rather than those living on the ground, the two Langley surveys added several new species to the existing lists which elevate Langley's position both locally and nationally. At the time of their addition it stood in second position in the SQI table for the South West and at 46th in the table for the UK.

Species

The capture of the RDB and Notable eucnemids *Hylis olexai* (Palm), *Epiphanis cornutus* Eschscholtz and *Microrhagus pygmaeus* (F.), and of the RDB chrysomelid *Ochrosis ventralis* (Illiger) was surprising and unexpected since none are ground dwellers. It is presumed that the insects fell or were blown into the traps from the surrounding vegetation. *Epiphanis cornutus* and *O. ventralis* were new county records and *H. olexai*, like the RDB leiodid *Leiodes lucens* (Fairmaire), only the second records for the county (Darby, 2005, 2009). Alexander notes that *O. ventralis* has a very local and scattered distribution in the UK and that there have been very few records in recent years (Alexander, 2006).

The huge number of the geotrupid *A. stercorosus* trapped in Outwood compared with the much smaller number found in Bishops Wood deserves special mention and is difficult to explain, particularly when one considers that one third the number of traps was involved in Outwood. As far as can be ascertained it appears to be without precedent in pitfall trapping ventures in British woodland (entomologists using the Beetles British Isles web site were asked to comment and a survey of the literature using the web proved negative). If more deer were present in Outwood than in Bishops Wood and thus more dung that might be one explanation, but there is no evidence to suggest that the deer population is that much smaller since no barriers exist to prevent their movement from one site to the other. It is true, however, that Outwood is more heavily shaded than much of Bishops Wood thus providing better cover. A second hypothesis is that the woodland edge is closer to surrounding pastureland at Outwood than Bishops Wood and that beetles were attracted into the wood from outside, and a third that because *A. stercorosus* is known to feed on fungi as well as dung there may be more underground fungi i.e. not visible in Outwood than in Bishops Wood.

The very large numbers of *A. stercorosus* present at the time trapping ceased (not just in the pots but also in, and on the surrounding ground (Fig. 2) suggested that a cumulative factor appeared to be involved whereby the presence of some insects attracted others. (an aggregation pheromone, dung adhering to new arrivals adding to the size of the food source, or the fresh dung itself acting as a more potent

attractant?) But this number of insects is never seen in pastureland where dung is plentiful (at least in the author's experience) suggesting that the opposite could also be true, i.e. that scarcity of dung in this part of the wood made pots containing some dung more attractive.

The fall in numbers of *A. stercorosus* during the winter months based on pitfall trap counts over that period, and the increase in the sampled numbers of another geotrupid *Typhaeus typhoeus* (L.), a species not previously reported to be a winter insect before these surveys, has been discussed elsewhere (Fremlin & Darby, 2010).

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References

Alexander, K. N. A. 2004. *Revision of the Index of Ecological Continuity as used for saproxylic beetles*. English Nature Report no. 574. 1–60.

Alexander, K. N. A. 2006. *Ochris ventralis* (Illiger): new Cornish records and a review of its ecology in Britain. *The Coleopterist* **15**: 127–129.

Assmann, T. 1999. The ground beetle fauna of ancient and recent woodlands in the lowlands of north-west Germany. *Biodiversity and Conservation* **8**: 1499–1517.

Darby, M. 2001. A first attempt to apply the Saproxylic Quality Index for Coleoptera to Wiltshire. *Recording Wiltshire's Biodiversity* **6**: 7–10.

Darby, M. & Alexander, K.N.A. 2003. The Use of Beetles in Evaluating the Saproxylic Quality of Savernake Forest. *Wiltshire Studies* **96**: 137–142.

Darby, M. 2005. *Epiphanus cornutus* Eschscholtz, *Hylis olexai* (Palm) and *Microrhagus pygmaeus* (Fabricius) (Eucnemidae) from pitfall traps in Wiltshire. *The Coleopterist* **14**: 127–128.

Darby, M. 2009(a). The Beetles of Wylye Down National Nature Reserve. *Wiltshire Studies* **102**, 1–11.

Darby, M. 2009(b). *Wiltshire Beetles. History, Status, Distribution and Use in Site Assessment*. Malthouse Books, 1–345.

Duff, A. G. 2012. *Checklist of the Beetles of the British Isles*, 2nd edition. Pemberley Books (Publishing).

Fowles, A. P., Alexander, K. N. A. & Key, R. S. 1999. The Saproxylic Quality Index: evaluating wooded habitats for the conservation of dead-wood Coleoptera. *The Coleopterist* **8**: 121–141.

Fremlin, M. & Darby, M. 2010. Seasonal activity of *Typhaeus typhoeus* (Linnaeus) (Geotrupidae). *The Coleopterist* **19:** 155–164.

Hyman, P. revised by Parsons, M. (1992, 1994) *A Review of the Scarce and Threatened Coleoptera of Great Britain*. Joint Nature Conservation Committee, 483, 248.

Luff, M. L. 1996. Environmental Assessments using Ground Beetles (Carabidae) and Pitfall Traps. pp 42-47 *in* Eyre, M. D. (ed.) 1996, *Environmental Monitoring, Surveillance and Conservation using Invertebrates*, EMS publications, 42–47.

Pope, R. D. 1977. Kloet and Hincks. A Check List of British Insects. Second edition (completely revised). Part 3: Coleoptera and Strepsiptera. *Handbooks for the Identification of British Insects* **11(3)**, i–xiv, 1–105.

Stewart, A. J. A. 2001. The impact of deer on lowland woodland invertebrates: a review of the evidence and priorities for future research. *Forestry* **74**: 259–270.

Appendix. The list of Coleoptera species and numbers of individuals recorded in pitfall traps at Bishops Wood and Outwood, Langley Wood National Nature Reserve, Wiltshire, 2004–2007.

Taxon	Status	Nos. BW	Date Range	Nos. OW	Date range
DYTISCIDAE					
Hydroperus obsoletus Aube	Nb			1	26 Oct 2006
CARABIDAE					
Cicindela campestris L.		7	22 Apr 2004–3 Jun 2004		
Carabus monilis F.	Nb			1	2 Jul 2007
Carabus nemoralis O.F. Müller		59	22 Apr 2004–24 Mar 2005	28	25 Aug 2006–06 Jun 2007
Carabus problematicus Herbst		223	14 May 2004–10 Dec 2004	286	5 Aug 2006–2 Jul 2007
Carabus violaceus L.		68	14 May 2004 -8 Oct 2004	74	5 Aug 2006–2 Jul 2007
Cychrus caraboides (L.)		21	14 May 2004–8 Oct 2004	8	5 Aug 2006–6 Jun 2007
Leistus rufomarginatus (Dufts.)		27	22 Apr 2004–11 Feb 2005	40	17 Nov 2006–2 Jul 2007
Leistus spinibarbis (F.)		13	14 May 2004–8 Oct 2004		
Nebria brevicollis (F.)		2088	22 Apr 2004–24 Mar 2005	4678	5 Aug 2006–2 Jul 2007
Notiophilus biguttatus (F.)		172	22 Apr 2004–24 Mar 2005	215	5 Aug 2006–2 Jul 2007
Notiophilus germinyi Fauvel		1	14 May 2004		
Notiophilus palustris (Dufts.)		14	22 Apr 2004–17 Sep 2004		
Notiophilus quadripunctatus Dejean	Nb	1	25 Jun 2004–25 Jun 2004		
Notiophilus rufipes Curtis		94	22 Apr 2004–24 Mar 2005	36	5 Aug 2006–2 Jul 2007
Notiophilus substriatus G.R. Waterhouse		1	8 Oct 2004	1	17 Nov 2006
Elaphrus cupreus Duftschmid		3	22 Apr 2004–3 Jun 2004		
Elaphrus riparius (L.)		4	14 May 2004–6 Aug 2004		
Loricera pilicornis (F.)		42	22 Apr 2004–24 Mar 2005	3	5 Aug 2006–25 Aug 2006
Clivina fossor (L.)		26	22 Apr 2004–24 Mar 2005		
Trechus obtusus Erichson		63	27 Aug 2004–24 Mar 2005	28	25 Aug 2006–20 Feb 2007
Trechus quadristriatus (Schrank)				1	2 Jul 2007
Trechus secalis (Paykull).		2	17 Sep 2004		
Asaphidion curtum (Heyden)		3	22 Apr 2004–24 Mar 2005	10	5 Jan 2007–6 Jun 2007
Bembidion lampros (Herbst)		185	22 Apr 2004–11 Feb 2005		
Bembidion mannerheimii C R Sahlberg		318	22 Apr 2004–24 Mar 2005	21	15 Sep 2006–25 Apr 2007
Poecilus cupreus (L.)		9	22 Apr 2004–24 Mar 2005	4	15 Sep 2006–6 Jun 2007
Poecilus versicolor (Sturm)		234	22 Apr 2004–19 Nov 2004	1	15 Sep 2006
Pterostichus madidus (F.)		595	22 Apr 2004–24 Mar 2005	466	5 Aug 2006–2 Jul 2007

(continued)

Appendix *(continued)*

Taxon	Status	Nos. BW	Date Range	Nos. OW	Date range
Pterostichus melanarius (Illiger)		74	14 May 2004–17 Sep 2004	123	5 Aug 2006–2 Jul 2007
Pterostichus niger (Schaller)		301	22 Apr 2004–8 Oct 2004	170	5 Aug 2006–2 Jul 2007
Pterostichus nigrita (Paykull)		96	22 Apr 2004–24 Mar 2005		
Pterostichus oblongopunctatus (F.)	Nb	114	22 Apr 2004–24 Mar 2005	67	5 Aug 2006–2 Jul 2007
Pterostichus strenuus (Panzer)		84	22 Apr 2004–24 Mar 2005		
Abax parallelepipedus (P. & M.)		2086	22 Apr 2004–10 Dec 2004	1141	25 Aug 2006–2 Jul 2007
Synuchus vivalis (Illiger)		1	17 Sep 2004		
Calathus rotundicollis Dejean		18	3 Jun 2004–17 Sep 2004	224	5 Aug 2006–2 Jul 2007
Platynus assimilis (Paykull)		7	14 May 2005–25 Jun 2004		
Agonum fuliginosum (Panzer)		42	14 May 2004–19 Nov 2004		
Amara aenea (De Geer)		4	14 May 2004–03 Jun 2004		
Amara curta Dejean	Nb	1	14 May 2004		
Amara familiaris (Duftschmid)		1	14 May 2004		
Amara similata (Gyllenhal)		1	14 May 2004	1	5 Aug 2006
Harpalus latus (L.)		102	14 May 2004–29 Oct 2004	3	6 Jun 2007
Harpalus rufipes (De Geer)		1	6 Aug 2004	1	6 Jun 2007
Bradycellus harpalinus (A.-Serville)		9	14 May 2004–3 Mar 2005	1	24 Mar 2007
Bradycellus sharpi Joy		2	10 Dec 2004–21 Jan 2004		
Acupalpus dubius Schilsky		40	3 Jun 2004–29 Oct 2004		
Acupalpus meridianus (L.)		4	3 Jun 2004–03 Jun 2004		
Panagaeus bipustulatus (F.)		4	3 Jun 2004–16 Jul 2004		
Dromius quadrimaculatus (L.)		2	27 Aug 2004–8 Oct 2004		
HELOPHORIDAE					
Helophorus grandis Illiger		1	22 Apr 2004	2	17 Nov 2006, 22 Jan 2007
HYDROPHILIDAE					
Anacaena globulus (Paykull)		132	22 Apr 2004–3 Mar 2005	3	15 Sep 2006–26 Oct 2006
Anacaena lutescens (Stephens)		1	14 May 2004		
Hydrobius fuscipes (L.)		1	14 May 2004		
Cercyon haemorrhoidalis (F.)				1	6 Jun 2007
Cercyon lateralis (Marsham)				18	5 Aug 2006
Sphaeridium lunatum F.		1	17 Sep 2004		

(continued)

Appendix *(continued)*

Taxon	Status	Nos. BW	Date Range	Nos. OW	Date range
HISTERIDAE					
Gnathoncus buyssoni Auzat	Na			1	5 Aug 2006
Onthophilus striatus (Forster)		1	8 Oct 2004		
Margarinotus brunneus (F.)				3	5 Aug 2006–2 Jul 2007
Margarinotus merdarius (J. Hoffman)		1	6 Aug 2004	3	5 Aug 2006
Margarinotus neglectus (Germar)		1	6 Aug 2004		
Margarinotus striola (C.R. Sahlberg)					5 Aug 2006–6 Jun 2007
Margarinotus ventralis (Marseul)		1	27 Aug 2004	55	5 Aug 2006
Hister unicolor L.		6	6 Aug 2004		
PTILIIDAE					
Acrotrichis intermedia (Gillmeister)		1	14 May 2004		
LEIODIDAE					
Leiodes calcarata (Erichson)		4	25 Jun 2004–31 Dec 2004	1	5 Aug 2006
Leiodes lucens (Fairmaire)	RDBK	1	27 Aug 2004		
Agathidium convexum Sharp		2	17 Sep 2004–8 Oct 2004		
Agathidium seminulum (L.)	SQI 2	1	25 Jun 2004		
Nargus velox (Spence)		9	8 Oct 2004–24 Mar 2005	68	15 Sep–17 Nov 2006
Nargus wilkinii (Spence)		11	8 Oct 2004–24 Mar 2005	8	5 Aug 2006–26 Oct 2006
Choleva jeanneli Britten		3	31 Dec 2004–24 Mar 2005		
Sciodrepoides fumatus (Spence)				20	25 Aug 2006
Sciodrepoides watsoni (Spence)		13	16 Jul 2004–17 Sep 2004		
Catops fuliginosus Erichson		8	14 May 2004–11 Feb 2005		
Catops kirbii (Spence)				5	26 Oct 2006
Catops coracinus Kellner				1	25 Aug 2006
Catops nigrita Erichson				12	25 Aug 2006–2 Jul 2007
Catops tristis (Panzer)		1		10	17 Nov 2006–8 Dec 2006
Ptomaphagus medius Rey				1	26 Oct 2006
Ptomaphagus subvillosus (Goeze)		3	14 May 2004–24 Mar 2005		
SILPHIDAE					
Thanatophilus rugosus (L.)					2 Jul 2007
Oiceoptoma thoracicum (L.)		6	16 Jul 2004–27 Aug 2004	30	5 Aug 2006–2 Jul 2007
Silpha atrata L.		42	14 May 2004–24 Mar 2005	7	15 Sep 2006–2 Jul 2007
Silpha tristis Illiger				8	5 Aug 2006

(continued)

PLATE 1. Fig. 1. A small group of *Cinara smolandiae* apterae on juniper, Dundreggan Estate, Inverness-shire, 2012. Fig. 2. A large group of *Cinara juniperi* apterae on juniper, Dundreggan Estate, Inverness-shire, 2012. Photos: Alan Watson Featherstone.

PLATE 2. *Dyroderes umbraculatus* (F.), female, Perivale Wood LNR, Middlesex, 29th June 2013. Fig. 1. Upperside. Fig. 2. Side view. Fig. 3. Underside.

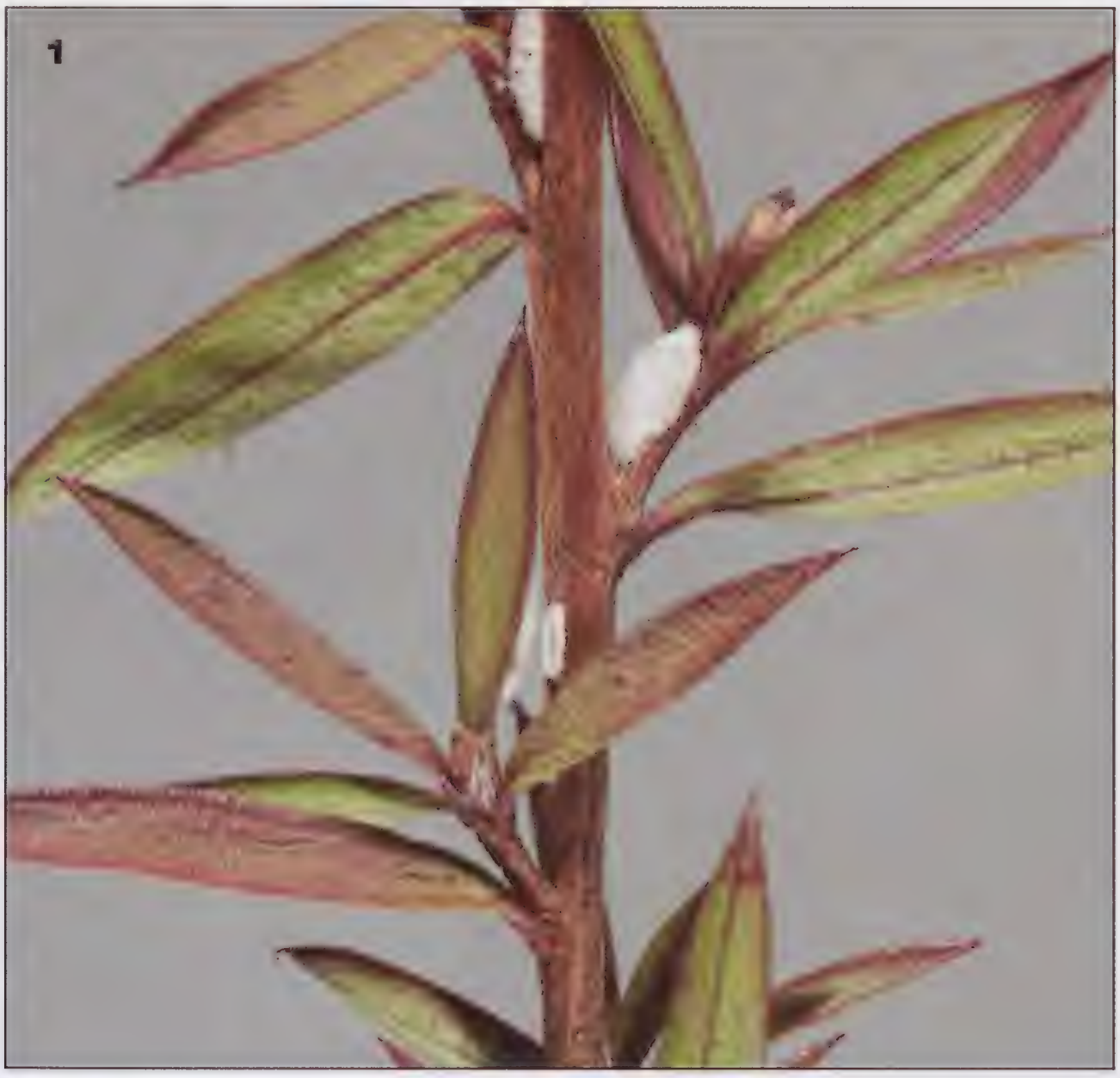


PLATE 3. Fig. 1. *Acanthococcus mariannae* colony on *Leptospermum*. Fig. 2. Female *A. mariannae* enclosed in a felted ovisac. Fig. 3. *A. mariannae* ovisac opened to reveal the orange and pale purple eggs. Fig. 4. *A. mariannae* male tests. Fig. 5. *A. mariannae* second instar nymph. © FERA.

PLATE 4. Figs 1 & 2. Trap lines in compartments A and D in Bishops Wood, Langley Wood NNR. Figs 3 & 4. Trap lines E and G in Outwood, Langley Wood NNR, 2006.

Appendix *(continued)*

Taxon	Status	Nos. BW	Date Range	Nos. OW	Date range
Nicrophorus humator (Gleditsch).		6	6 Aug 2004–8 Oct 2004	1	5 Aug 2006
Nicrophorus interruptus Stephens	Nb	1	6 Aug 2004		
Nicrophorus vespillo (L.)		8	16 Jul 2004–6 Aug 2004	2	5 Aug 2006
Nicrophorus vespilloides Herbst		186	14 May 2004–8 Oct 2004	78	5 Aug 2006–2 Jul 2007
STAPHYLINIDAE					
Anthobium atrocephalum (Gyllenhal)		20	19 Nov 2004–24 Mar 2005	61	17 Nov 2006–6 Jun 2007
Anthobium unicolor (Marsham)				1	5 Jan 2007
Lesteva sicula heeri Fauvel		3	3 Jun 2004–31 Dec 2004		
Olophrum piceum (Gyllenhal)		147	22 Apr 2004–24 Mar 2005	1	20 Feb 2007
Omalium caesum Gravenhorst				2	5 Aug 2006
Proteinus atomarius Erichson		1	6 Aug 2004		
Proteinus brachypterus (F.)		11	19 Nov 2004–03 Mar 2005	11	6 Oct 2006–20 Feb 2007
Micropeplus staphylinoides (Marsham)		3	17 Sep 2004–31 Dec 2004		
Brachygluta fossulata Reichenbach		1	14 May 2004		
Bryaxis curtisii (Leach)		1	27 Aug 2004		
Bythinus macropalpus Aubé		1	16 Jul 2004		
Pselaphus heisei Herbst		1	14 May 2004		
Bolitobius cingulatus (Mannerheim)				3	5 Aug 2006–6 Jun 2007
Mycetoporus clavicornis (Stephens)		1	3 Mar 2005	2	20 Feb 2007, 24 Mar 2007
Mycetoporus rufescens (Stephens)				4	17 Nov 2006–22 Jan 2007
Parabolitobius inclinans (Gravenhorst)		2	3 Mar 2005–24 Mar 2005		
Tachinus humeralis Gravenhorst				1	6 Oct 2006
Tachinus proximus Kraatz				2	6 Jun 2007
Tachinus rufipes (L.)		4	14 May 2004–27 Aug 2004	17	15 Sep 2006–6 Jun 2007
Tachyporus hypnorum (F.)		3	24 Mar 2005–24 Mar 2005	1	5 Jan 2007
Tachyporus nitidulus F.		4	14 May 2004–24 Mar 2005		
Habrocerus capillaricornis (Gravenhorst)		1	25 Jun 2004		
Aleochara curtula (Goeze)		8	16 Jul 2004–27 Aug 2004	21	5 Aug 2006–15 Sep 2006
Alaobia gagatina (Baudi)		2	27 Aug 2004–27 Aug 2004		
Atheta brunneipennis (C.G.Thomson)				7	15 Sep 2006–17 Nov 2006
Atheta crassicornis (F.)				2	6 Jun 2007
Atheta fungicola (C.G. Thomson)		1	6 Aug 2004	1	5 Aug 2006
Atheta graminicola (Gravenhorst)				1	6 Jun 2007

(continued)

Appendix *(continued)*

Taxon	Status	Nos. BW	Date Range	Nos. OW	Date range
Mocyta fungi (Gravenhorst)				4	25 Aug 2006–6 Jun 2007
Cypha longicornis (Paykull)		1	3 Jun 2004		
Ocalea picata (Stephens)		16	3 Jun 2004–03 Mar 2005		
Ilyobates bennetti Donisthorpe	Notable			1	15 Sep 2006
Oxypoda lividipennis Mann.		93	19 Nov 2004–24 Mar 2005	198	26 Oct 2006–6 Jun 2007
Coprophilus striatulus (F.)		1	6 Aug 2004		
Anotylus inustus (Gravenhorst)		1	14 May 2004	31	5 Aug 2006–2 Jul 2007
Anotylus rugosus (F.)				1	25 Aug 2006
Anotylus sculpturatus (Gravenhorst)		8	14 May 2004–24 Mar 2005	16	5 Aug 2006–17 Nov 2006
Anotylus tetracarinatus (Block)		4	3 Jun 2004–16 Jul 2004	6	5 Aug 2006
Neuraphes elongatulus (M.& K.)		1	16 Jul 2004		
Stenichnus collaris (M.& K.)		3	16 Jul 2004–21 Jan 2005		
Scydmaenus tarsatus M.& K.		2	6 Aug 2004		
Stenus aceris Stephens		8	8 Oct 2004–24 Mar 2005		
Stenus brunnipes Stephens		1	24 Mar 2005		
Stenus providus Erichson		7	14 May 2004–27 Aug 2004		
Lathrobium brunnipes (F.)		2	6 Aug 2004–17 Sep 2004		
Lathrobium fovulum Stephens		1	3 Jun 2004		
Lathrobium geminum Kraatz		7	14 May 2004–25 Jun 2004		
Rugilus rufipes Germar		6	14 May 2004–25 Jun 2004		
Othius myrmecophilus Kies.		5	14 May 2004–24 Mar 2005	21	25 Aug 2006–24 Mar 2007
Othius punctulatus (Goeze)		49	22 Apr 2004–24 Mar 2005	59	6 Oct 2006–6 Jun 2007
Gabrius splendidulus (Gravenhorst)	SQI 1			5	24 Mar 2007–6 Jun 2007
Philonthus addendus Sharp				1	5 Aug 2006
Philonthus carbonarius (Gravenhorst)		4	17 Sep 2004–19 Nov 2004		
Philonthus cognatus Stephens				13	15 Sep 2006–6 Jun 2007
Philonthus decorus (Gravenhorst)		26	14 May 2004–17 Sep 2004	236	5 Aug 2006–2 Jul 2007
Philonthus laminatus (Creutzer)		2	8 Oct 2004–10 Dec 2004		
Philonthus politus (L.)		12	6 Aug 2004–27 Aug 2004	4	5 Aug 2006–26 Oct 2006
Philonthus splendens F.				1	5 Aug 2006
Philonthus tenuicornis Mulsant & Rey				2	5 Aug 2006, 26 Oct 2006
Philonthus varians (Paykull)		1	24 Mar 2005		
Quedius lateralis (Gravenhorst)		26	14 May 2004–19 Nov 2004	59	06 Oct 2006–6 Jun 2007

(continued)

Appendix *(continued)*

Taxon	Status	Nos. BW	Date Range	Nos. OW	Date range
Quedius curtipennis Bernhauer		1	25 Jun 2004	1	6 Jun 2007
Quedius fuliginosus (Gravenhorst)		51	22 Apr 2004–24 Mar 2005	8	17 Nov 2006–6 Jun 2007
Quedius maurorufus (Gravenhorst)		5	22 Apr 2004–10 Dec 2004	1	22 Jan 2007
Quedius nigriceps Kraatz				30	6 Oct 2006–20 Feb 2007
Quedius nitipennis (Stephens)				1	8 Dec 2006
Quedius picipes (Mannerheim)		6	22 Apr 2004–19 Nov 2004		
Quedius levicollis (Brullé)				1	26 Oct 2006
Ocypus aeneocephalus (De Geer)		3	10 Dec 2004–24 Mar 2005	38	15 Sep 2006–2 Jul 2007
Ocypus olens (O.F. Müller)		189	22 Apr 2004–10 Dec 2004	183	5 Aug 2006–20 Feb 2007
Ontholestes murinus (L.)				1	5 Aug 2006
Platydracus fulvipes (Scopoli)	Nb	1	25 Jun 2004		
Platydracus latebricola (Gravenhorst)	Nb	13	14 May 2004–25 Jun 2004		
Tasgius globulifer (Geoffroy)		107	22 Apr 2004–24 Mar 2005		
Tasgius melanarius (Heer)				2	5 Jan 2007
Tasgius morsitans (Rossi)		142	6 Aug 2004–11 Feb 2005	17	5 Aug 2006–26 Oct 2006
Gyrohypnus angustatus Stephens		1	14 May 2004		
Gyrohypnus punctulatus (Paykull)				1	26 Oct 2006
Xantholinus linearis (Olivier)		203	22 Apr 2004–24 Mar 2005	52	26 Oct 2006–02 Jul 2007
Xantholinus longiventris Heer				2	8 Dec 2006
GEOTRUPIDAE					
Typhaeus typhoeus (L.)		127	22 Apr 2004–24 Mar 2004	194	26 Oct 2006–2 Jul 2007
Anoplotrupes stercorosus (Scriba)		998	22 Apr 2004–29 Oct 2004	19793	5 Aug 2006–2 Jul 2007
SCARABAEIDAE					
Aphodius ater (De Geer)		1	16 Jul 2004		
Aphodius sticticus (Panzer)		10	03 Jun 2004–25 Jun 2004	1	6 Jun 2007
Aphodius granarius (L.)				1	6 Jun 2007
Aphodius obliteratus Sturm				21	26 Oct 2006–17 Nov 2006
Aphodius prodromus (Brahm)		3	22 Apr 2004–19 Nov 2004	3	26 Oct 2006–17 Nov 2006
Aphodius rufipes (L.)		1	6 Aug 2004		
Aphodius sphacelatus (Panzer)		2	21 Jan 2005–3 Mar 2005	1	5 Jan 2007
Onthophagus coenobita (Herbst)		1	16 Jul 2004	32	5 Aug 2006–2 Jul 2007
Onthophagus joannae Goljan		2	14 May 2004–6 Aug 2004	2	6 Jun 2007
Onthophagus similis (Scriba).				1	6 Jun 2007

(continued)

Appendix *(continued)*

Taxon	Status	Nos. BW	Date Range	Nos. OW	Date range
Melolontha melolontha (L.)		1	14 May 2004		
Serica brunnea (L.)				4	5 Aug 2006
BUPRESTIDAE					
Agrilus laticornis (Illiger)	Nb SQI 8	1	6 Aug 2004		
BYRRHIDAE					
Cytilus sericeus (Forster)		4	14 May 2004–03 Jun 2004		
Byrrhus pilula (L.)		13	14 May 2004–24 Mar 2005	8	24 Mar 2007–2 Jul 2007
Byrrhus pustulatus (Forster)		1	14 May 2004		
EUCNEMIDAE					
Hylis olexai (Palm)	RDB3 SQI 24	1	6 Aug 2004		
Epiphanis cornutus Eschscholtz.	SQI 8	1	25 Jun 2004		
Microrhagus pygmaeus (F.)	RDB3 SQI 8 IEC 3	1	25 Jun 2004		
THROSCIDAE					
Trixagus carinifrons (de Bonvouloir)		1	3 Jun 2004	1	25 Aug 2006
Trixagus dermestoides (L.)		5	3 Jun 2004–16 Jul 2004	87	25 Apr 2007–2 Jul 2007
ELATERIDAE					
Denticollis linearis (L.)	SQI 1	1	3 Jun 2004	1	6 Jun 2007
Athous haemorrhoidalis (F.)		19	14 May 2004–27 Aug 2004	2	6 Jun 2007
Athous vittatus (F.)		1	14 May 2004	4	6 Jun 2007
Agriotes obscurus (L.)		6	25 Jun 2004–6 Aug 2004	2	2 Jul 2007
Agriotes pallidulus (Illiger)		119	22 Apr 2004–6 Aug 2004	985	5 Aug 2006–2 Jul 2007
LAMPYRIDAE					
Lampyris noctiluca (L.)		1	22 May 2004		
CANTHARIDAE					
Rhagonycha fulva (Scopoli)				1	25 Aug 2006
Malthodes fibulatus Kiesenwetter	Nb SQI 8			1	2 Jul 2007
PTINIDAE					
Ptinus subpilosus Sturm	Nb SQI 8 IEC 2	1	16 Jul 2004		

(continued)

Appendix *(continued)*

Taxon	Status	Nos. BW	Date Range	Nos. OW	Date range
DASYTIDAE					
Dasytes aeratus Stephens	SQI 2	7	14 May 2004–16 Jul 2004		
NITIDULIDAE					
Omosita depressa (L.)				7	5 Aug 2006–6 Oct 2006
Omosita discoidea (F.)				1	17 Nov 2006
Glischrochilus hortensis (G. in F.)		1	6 Aug 2004		
Glischrochilus quadriguttatus (F.)	SQI 2	1	25 Jun 2004		
MONOTOMIDAE					
Rhizophagus dispar (Paykull)	SQI 1	1	24 Mar 2005		
PHALACRIDAE					
Phalacrus fimetarius (F.)				5	5 Aug 2006–6 Oct 2006
ENDOMYCHIDAE					
Lycoperdina bovistae (F.)	RDB3	3	17 Sep 2004–10 Dec 2004		
COCCINELLIDAE					
Adalia decempunctata (L.)		1	24 Mar 2005		
LATRIDIIDAE					
Cartodere nodifer (Westwood)		2	25 Jun 2004–6 Aug 2004		
Enicmus histrio Joy & Tomlin		9	3 Jun 2004–16 Jul 2004		
Enicmus transversus (Olivier)		1	6 Aug 2004		
Dienerella clathrata (Mannerheim)		1	25 Jun 2004		
MELANDRYIDAE					
Orchesia undulata Kraatz	SQI 4 IEC 3			1	2 Jul 2007
TENEBRIONIDAE					
Nalassus laevioctostriatus (Goeze)		16	22 Apr 2004–24 Mar 2005	1	24 Mar 2007
OEDEMERIDAE					
Oedemera lurida (Marsham)				1	6 Jun 2006
SCRAPTIIDAE					
Anaspis rufilabris (Gyllenhal)	SQI 1	1	25 Jun 2004		
CERAMBYCIDAE					
Grammoptera ruficornis (F.)	SQI 1				2 Jul 2007
Leiopus nebulosus (L.)	SQI 2	1	6 Aug 2004		

(continued)

Appendix *(continued)*

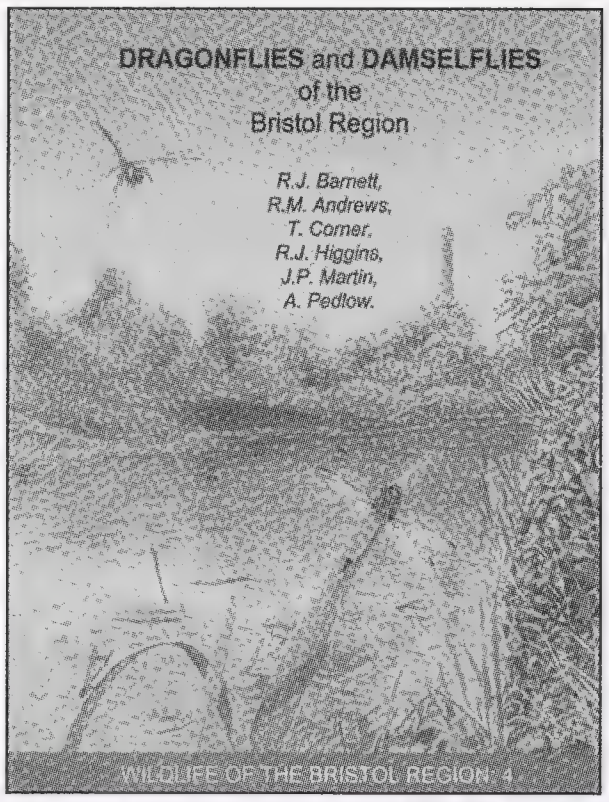
Taxon	Status	Nos. BW	Date Range	Nos. OW	Date range
CHRYSOMELIDAE					
Cryptocephalus pusillus F.		1	Aug 2004		
Chrysolina polita (L.)		2	16 Jul 2004–16 Jul 2004		
Gastrophysa polygoni (L.)		1	3 Jun 2004		
Lochmaea caprea (L.)		1	14 May 2004		
Lochmaea suturalis (C.G. Thomson)		3	3 Jun 2004–24 Mar 2005		
Phyllotreta nigripes (F.)		1	3 Mar 2005		
Aphthona euphorbiae (Schrank)		86	14 May 2004–24 Mar 2005	55	25 Aug 2006–6 Jun 2007
Longitarsus dorsalis (F.)	Nb	2	14 May 2004–21 Jan 2005		
Altica ericeti (Allard)	Nb	1	16 Jul 2004		
Ochrosis ventralis (Illiger)	RDB3	1	3 Jun 2004		
Neocrepidodera transversa (Marsham)		2	6 Aug 2004–17 Sep 2004		
Chaetocnema concinna (Marsham)		1	14 May 2004		
Apteropeda orbiculata (Marsham)		5	17 Sep 2004–24 Mar 2005		
APIONIDAE					
Synapion ebeninum (Kirby)		1	3 Jun 2004		
CURCULIONIDAE					
Archarius pyrrhoceras (Marsham)		6	3 Jun 2004–27 Aug 2004		
Curculio glandium Marsham		2	16 Jul 2004–8 Oct 2004		
Curculio venosus (Gravenhorst)		3	27 Aug 2004–17 Sep 2004		
Rhynchaenus pilosus (F.)		1	17 Sep 2004		
Rhinoncus pericarpius (L).		1	25 Jun 2004		
Euophryum confine (Broun)		1	6 Aug 2004		
Acalles misellus Boheman	SQI 2	3	14 May 2004–3 Jun 2004		
Acalles ptinoides (Marsham)	Nb	2	27 Aug 2004–19 Nov 2004		
Kyklioacalles roboris (Curtis)	Nb SQI 8	11	03 Jun 2004–06 Aug 2004	2	25 Aug 2006
Strophosoma melanogrammum (Forst.)		230	14 May 2004–24 Mar 2005	52	5 Aug 2006–2 Jul 2007
Otiorhynchus singularis (L.)		1	6 Aug 2004		
Phyllobius pyri (L.)		1	16 Jul 2004	2	5 Aug 2006
Liophloeus tessulatus (O.F.Muller)		2	25 Jun 2004	1	5 Aug 2006
Polydrusus pterygomalis Boheman		1	25 Jun 2004		
Polydrusus tereticollis (De Geer)				1	6 Jun 2007

(continued)

Appendix *(continued)*

Taxon	Status	Nos. BW	Date Range	Nos. OW	Date range
Barypeithes araneiformis (Schrank)		132	14 May 2004–27 Aug 2004	12	25 Aug 2006–2 Jul 2007
Barypeithes pellucidus (Boheman)		533	22 Apr 2004–17 Sep 2004		
Sitona lineatus (L.)				1	6 Oct 2006
Sitona striatellus Gyllenhal		1	27 Aug 2004		
Sitona suturalis Stephens		16	27 Aug 2004–17 Sep 2004		
Caenopsis fissirostris (Walton)	Nb	1	17 Sep 2004		
Caenopsis waltoni (Boheman)		373	14 May 2004–24 Mar 2005	11	15 Sep 2006–6 Jun 2007
Tropiphorus elevatus (Herbst)	Nb	2	22 Apr 2004–14 May 2004		
Hypera meles (F.)	Na	1	14 May 2004		
Magdalis carbonaria (L.)	Nb SQI 4	1	6 Aug 2004		
Leiosoma oblongulum Boheman	Nb			7	25 Apr 2006–2 Jul 2007
Hylobius abietis (L.)		1	27 Aug 2004		
Orobitis cyaneus (L.)		1	14 May 2004		
Dryocoetes villosus (F.)	SQI 2	1	25 Jun 2004		
Hylastes ater (Paykull).	SQI 1	1	14 May 2004		
Hylastes attenuatus Erichson		2	3 Jun 2004–3 Jun 2004		
Hylastes opacus Erichson	SQI 2	1	3 Jun 2004		

The species names and generic order are as in Duff (2012) though an alphabetical sequence has been followed within genera. RDB, Na, Nb and notable classifications from Hyman & Parsons (1992, 1994). Saproxylic Quality Index (SQI) scores from Fowles, Alexander & Fremlin (1999) and Index of Ecological Continuity (IEC) scores from Alexander (2004). BW = Bishops Wood; OW = Outwood. Space did not allow for the Date Range figures to include a gap over the winter months. This information is available from the author if required.



BOOK REVIEW

Dragonflies and Damselflies of the Bristol Region by R. J. Barnett, R. M. Andrews, T. Corner, R. J. Higgins, J. P. Martin & A. Pedlow. 150pp (Bristol Regional Environmental Records Centre, 2013). ISBN 978-0-9545235-2-7. £22.00 including p&p available from BRERC, Third Floor, Bristol Central Library, College Green, Bristol BS1 5TL.

This is the fourth publication by the Bristol Regional Environmental Records Centre in the series "Wildlife of the Bristol region" and is the result of a joint project by the six main authors. On pages 146 and 147 there is an individual photograph of each author accompanied by a brief account of their expertise and involvement in wildlife.

After the foreword by Phillippa Forrester, the Acknowledgements and the Introduction by Ray Barnett, there are four chapters. The titles of chapters 1 to 3 are: The Geological Record, Conservation and Habitats, and Dragonfly Recording, each with photographs in the text. Spread over 46 pages they provide a comprehensive coverage of each subject. Chapter 4 covers the Species Accounts of 32 species recorded in the region. Each entry is given two to four pages listing sub-order, family, species names, national status, Bristol region status, number of records and number of 1km squares. Each account has at least one photograph, most have several, and a detailed regional distribution map. The map symbols, pink for 1990–1999 and red for 2000–2011, have not been placed centrally in each square but placed in the position of the relevant map reference. With each map is a flight chart in the form of a bar chart with sightings numbered vertically and the date shown horizontally. The five best recorded species also have a table detailing all records for each including date, location, recorder and frequency. There has been no attempt to describe each species and there are no headings to each paragraph. The main thrust of each account is about records, past and present, and some detail of the location and type of habitat where the species has been or may be seen. The final 11 pages are of References, Bibliography, List of Recorders, The Authors and Index of English and Scientific names.

Since the early days of regional books, bound with staples, soft covers, and black and white illustrations and maps, there have been great strides, with the help of sponsorship, in graphic design, use of colour throughout and better binding, resulting in publications that are more appealing to a wider range of people. This book is attractively presented, hard-back bound, well-written and illustrated with many good quality photographs. It is a worthy addition to the growing number of regional dragonfly books.

JOHN BROOK

A PROVISIONAL LIST OF THE MOTHS OF LUNDY, DEVON

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Abstract

A provisional list of the moths of Lundy, in the Bristol Channel and forming part of recording unit vice-county 4 (North Devon), is set out below in advance of the field meeting to be held there from 5–8 July 2014 by the British Entomological and Natural History Society. The list does not claim to include every published or unpublished record because the research for this would be considerable. All known lists of Lundy Lepidoptera have been consulted and a total of 358 species in 40 families are listed here. Of those, we consider that nine species and one family are erroneous records and give our reasons against the relevant entry in the list provided. The field meeting will undoubtedly add to these records.

Introduction

Lundy is an island in the Bristol Channel about 18 km NNW of Hartland Point on the north Devon coast and forms part of vice-county 4 (North Devon). It is approximately five km long and one and a third km at its widest with an area of about 445 hectares, and lies in a north/south orientation at co-ordinates 51°10′ N, 4°40′ W. In general the island is edged by steep cliffs rising to a gently undulating plateau which is approximately 143m at its highest point. Most of the island is granite but the south-east corner is comprised of Devonian slates which are less acidic. The exceptional interest of the surrounding sea resulted in Lundy becoming England's first statutory Marine Conservation Zone in 1986. The whole island is a Site of Special Scientific Interest and is owned by the National Trust and administered by the Landmark Trust.

There are a number of publications that deal with various aspects of Lundy, e.g. archaeology, geology, birds etc. Ivimey-Cook (1984) provides the most recent account of the vascular plants of Devon, including Lundy. This gives a summary for every species with distribution maps, on a tetrad basis, for most. We have derived much helpful information from an unpublished Biological Survey for the National Trust (Hemsley, Alexander & Hearn, 1992).

In general the plateau vegetation comprises acidic grassland with heathland towards the north. There are some bog areas the largest of which is adjacent to Pondsbury. There are few trees and most of those are planted and occur in the south-eastern valleys. The eastern cliffs developed extensive *Rhododendron ponticum* L. Rhododendron cover but this is being eradicated (pers. obs.).

Over the centuries cattle, sheep, horses, deer, goats and rabbits have been present on Lundy in varying numbers. Sika deer were introduced in 1927 and Soay sheep in 1942 (Hemsley, Alexander & Hearn, 1992: 65–66) and both survive (pers. obs.). At some time, probably in the 1970s, there were about 400 breeding ewes and certainly in the 1990s there was considerable overgrazing by sheep which have now been reduced. In various ways and by various management strategies these animals have all had an impact on the vegetation, and not always a favourable one from the perspective of the native fauna and flora.

We do not attempt to summarise the vegetation but special mention must be made of the only endemic species *Coincya wrightii* (O. E. Schulz) Stace, the Lundy Cabbage. It is found mainly along the south-east coast. It supports *Psylliodes luridipennis* Kutschera (Chrysomelidae), an endemic flea beetle, and *Ceutorhynchus contractus* (Marsham) f. *pallipes* Crotch (Curculionidae), an endemic variety of weevil. *Psylliodes napi* (F.), another flea beetle, is not endemic but on Lundy varies from being acutely brachypterous to having a wing about three-quarters the normal length and is broader in body shape than those on the mainland (Cox, 2007: 296).

Probably the most significant moth species that occurs on Lundy is *Nothris congressariella* (Bruand) (Gelechiidae). The first confirmed record, in 1993, was by Key (1995), but it is possible that larvae found in 1986 were of this species. It has been accorded pRDB1 status by Davis (2012: 19). This is defined as meaning a species that has been found to occur in 5 or fewer 10km squares in the period 1980–2011. The larva feeds on *Scrophularia scorodonia* L. Balm-leaved Figwort which is not uncommon in the coastal area of the far south-east of the island. The plant has a very restricted distribution in the British Isles, occurring as a native on the Isles of Scilly and at a few places in Cornwall and Devon (although not otherwise in VC4) and naturalised in south Hampshire and south Wales. Although the moth is known from the Isles of Scilly and a few places in Cornwall it is has not been found in any other part of Devon.

History of records

Possibly the first published moth record from Lundy was of *Hada plebeja* (L.) Shears (Noctuidae) by T. V. Wollaston in 1845. The first list of butterflies and moths was provided by Chanter in 1877. Chanter gives only 26 species of moths but cryptically states at the end of the list: 'And many others not sufficiently identified to be named, especially amongst the Tineae.' Chanter did not record or identify any of these himself; all the records were made by the Reverend Hudson Grosett Heaven, who became the owner of Lundy upon his father's death in 1883 and remained owner until 1916. Unfortunately, we consider that his records of three species, *Gillmeria ochrodactyla* ([D. & S.]) (Pterophoridae), *Malacosoma castrensis* (L.) Ground Lackey (Lasiocampidae) and *Endromis versicolora* (L.) Kentish Glory (Endromidae), are erroneous and there is doubt about at least *Eulithis mellinata* (F.) Spinach and *Menophra abruptaria* (Thunberg) Waved Umber (both Geometridae). Further, he is, apparently, the only one to have recorded *Phymatopus hecta* (L.) Gold Swift (Hepialidae), *Wheeleria spilodactylus* (Curtis) (Pterophoridae), *Ennomos alniaria* (L.) Canary-shouldered Thorn (Geometridae) and *Notodonta dromedarius* (L.) Iron Prominent (Notodontidae).

In 1878 Parfitt published a list of all the known Devon Lepidoptera. The last three pages give a list of species from Lundy, without data. The moths totalled 51 and included all the species recorded by Heaven given by Chanter.

Then in 1907 Longstaff published a list of the Lepidoptera from the island. This was based on seven or eight day visits that he had made, all in the company of others, and included all of Heaven's butterfly and moth records. Significantly, Longstaff comments that Heaven 'modestly disclaims being a skilled Entomologist.' The overall total was 93 of which 22 were butterflies and 71 were moths. Longstaff states that as a result of these visits:

> '. . . I have confirmed 14 of Mr. Heaven's species, and added 46 not noted by him, thus leaving 33 species that require confirmation ; of these, at least 24 are such as one might well expect to meet with, but a few are decidedly startling.'

The 33 requiring confirmation were enclosed in square brackets and comprised 11 butterfly and 20 moth species from Heaven and 2 moth species from others.

Palmer included a list of Lepidoptera in his 1946 account of the Fauna and Flora of the Ilfracombe district of north Devon. He marked with an 'L' symbol those species recorded from Lundy, stating they were all Longstaff's. The overall total was 73 of which 20 were butterflies and 53 were moths. It is difficult to know why this was more than the 'confirmed' number of 47 moth species given by Longstaff but less than his overall total of 71.

From 1947 the Lundy Field Society has produced Annual Reports on various aspects of the island and most include Lepidoptera records, the first appearing in 1948. The 1973 Annual Report included a compilation of moth records from earlier reports, giving the year but no other data. This totalled 85 species.

We have traced a few records from Lundy published in various journals, and no doubt there are many that we have not found. The Devon Moth Group database also holds a number of unpublished records. Hemsley, Alexander & Hearn (1992) also include a number of species. We visited Lundy from 17–24 September 2011 and found several Microlepidoptera apparently not previously recorded from the island. We have little doubt that the 5–8 July 2014 field meeting will produce more 'new' records.

Until now we are unaware of any publication which has compiled all these records into one list. The total now stands at 349, including doubtful records and those requiring confirmation either because the only records are very old or because, for example, identification needs to be determined by genitalia examination. This total does not include nine species which are in published accounts but which we consider erroneous. We cite them for completeness. We have indicated doubtful records and those requiring confirmation by an asterisk (*); those that are considered to be erroneous are enclosed in square brackets [ ]. We include explanatory notes on these species. We do not attempt to determine which are resident and which are immigrants or wanderers from the mainland. This is because not enough is yet known about their occurrence on Lundy, although some species are obviously immigrants, such as *Acherontia atropos* (L.) Death's-head Hawk-moth (Sphingidae).

The major lists are summarised in Table 1.

Although it is a provisional list, we hope that it makes a contribution to the knowledge of the moths of the island and may be useful to those attending the Society's field meeting from 5–8 July this year.

In order not to make it too cumbersome, we have not provided any details of published records. We have simply cited either the author of the publication or, in the case of records given in the Annual Reports of the Lundy Field Society, the year of the report. We have not included unpublished records contained within the Devon Moth Group database if they have been included in the Annual Reports or if they are of a species included in such a Report for the same year although not by the same recorder. If the unpublished record is the only one for that year then we have given the year followed by the recorder's name in brackets. We have not included species given by Hemsley, Alexander & Hearn (1992) if they are simply citing published records but we do include them where the record is unpublished. Details are given of species that are otherwise unreported and unpublished.

Species recorded

Numbering, nomenclature and classification order follows Agassiz, Beavan & Heckford (2013). This new checklist allocates a number based on the species within a

Table 1. Published moth species lists for Lundy. See text for additional details and comment.

Reference	Total moth species listed	Notes
Chanter (1877)	26	All records made by Rev. H. G. Heaven; three erroneous and some doubtful.
Parfitt (1878)	51	Includes all species listed by Chanter (1877).
Longstaff (1907)	71	33 of these had not been seen by Longstaff and which he considered required confirmation, although he thought that at least 24 could be expected to be met with.
Palmer (1946)	53	Unclear why fewer species listed than Longstaff (1907).
Lundy Field Society Annual Report 1973	85	Compilation of records from previous LFS Annual Reports; no data except year of Annual Report given for each record.
This paper	358	Includes records considered to be erroneous and doubtful, and some requiring confirmation.

(numbered) family. The European Community commissioned a list of fauna to be prepared which has appeared as Fauna Europaea www.faunaeur.org/ and the sequence of families and genera follows that classification, updated in certain respects. The sequence of species within genera mainly follows that in mainland European publications such as the Danish checklist (Karsholt & Nielsen, 2013) published last year. The numbers in italics in round brackets are those in Bradley (2000).

Abbreviations:
BB = Bewsher, B.
Bristowe = Bristowe, W. S. See References
SDB & RJH = Beavan, Miss S. D. & Heckford, R. J.
Carpenter = Carpenter, G. D. H. See References
Chanter = Chanter, J. R. See References
Dannreuther = Dannreuther, T. See References
MH = Harvey, M.
RJH = Heckford, R. J.
Hemsley, Alexander & Hearn = Hemsley, J., Alexander, K. & Hearn, K. See References
Key = Key, R. S. See References
Longstaff = Longstaff, G. B. See References
McCormick = McCormick, R. See References
Palmer = Palmer, M. G. See References
Martineau = Martineau, A. H. See References
Parfitt = Parfitt, E. See References
Smith = Smith, K. G. V. See References
Walker = Walker, F. A. See References
TJW = Wallace, T. J.
Wollaston = Wollaston, T. V. See References
HW = Wooltorton, H.

MICROPTERIGIDAE
1.004 (*4*) *Micropterix aruncella* (Scopoli): 1993.

HEPIALIDAE
3.001 (*15*) *Triodia sylvina* (L.) Orange Swift: 1986; 1987; 1995; 2012.
3.002 (*17*) *Korscheltellus lupulina* (L.) Common Swift: 1987; 1992; 2009; 2010.
*3.004 (*16*) *Phymatopus hecta* (L.) Gold Swift: Chanter; Parfitt; Longstaff. Although not uncommon in both VCs 3 and 4, it is curious that there are no other records. Indeed, as Parfitt and Palmer merely list the species and Longstaff refers to Heaven's record given by Chanter, it is probable that Heaven is the only person to have recorded it.

NEPTICULIDAE
4.035 (*68*) *Stigmella salicis* (Stainton): 2011.
4.045 (*50*) *Stigmella aurella* (F.): 1993; 2011.
4.068 (*46*) *Trifurcula immundella* (Zeller): 1988.

PSYCHIDAE
11.009 (*185*) *Luffia ferchaultella* (Stephens): 2000 & 2001.
11.012 (*186*) *Psyche casta* (Pallas): 2011.

TINEIDAE
12.036 (*227*) *Monopis laevigella* ([D. & S.]): 1995; 2000 & 2001.

GRACILLARIIDAE
15.010 (*288*) *Caloptilia stigmatella* (F.): 2011.
15.015 (*294*) *Aspilapteryx tringipennella* (Zeller): 2011.
15.033 (*309*) *Parornix torquillella* (Zeller): 2011.
15.040 (*321*) *Phyllonorycter messaniella* (Zeller): 1989; 2011; 2012.
15.070 (*348*) *Phyllonorycter quinqueguttella* (Stainton): 1989; 1992; 2011.
15.083 (*361*) *Phyllonorycter trifasciella* (Haworth): 2011.

YPSOLOPHIDAE
17.003 (*453*) *Ypsolopha dentella* (F.): 1993 (MH); 1995.

PLUTELLIDAE
18.001 (*464*) *Plutella xylostella* (L.): 1986; 1990; 1993; 1996; 1997; 2002; 2006; 2008.

GLYPHIPTERIGIDAE
19.007 (*391*) *Glyphipterix simpliciella* (Stephens): 1984.

ARGYRESTHIIDAE
20.012 (*411*) *Argyresthia goedartella* (L.): 1988; 1989.
20.023 (*422*) *Argyresthia albistria* (Haworth): 1988.

LYONETIIDAE
21.001 (*263*) *Lyonetia clerkella* (L.): 2011.

BEDELLIIDAE
24.001 (*264*) *Bedellia somnulentella* (Zeller): 2011.

OECOPHORIDAE
28.010 (*647*) *Hofmannophila pseudospretella* (Stainton): 1988–1990; 1992; 1995; 2000 & 2001.
28.019 (*649*) *Esperia sulphurella* (F.): 1984; 2000 & 2001, given as *Endrosis sulphurella*.

LYPUSIDAE
*30.003 (*660*) *Pseudatemelia josephinae* (Toll): 1989. This is normally a woodland

species. Although there are some trees on Lundy they do not amount to woodland. It is possible that the record is a misidentification of 28.010 *Hofmannophila pseudospretella*.

DEPRESSARIIDAE

32.015 (*692*) *Agonopterix subpropinquella* (Stainton): 1995; 2011.
*32.016 (*696*) *Agonopterix propinquella* (Treitschke); Parfitt. As this is the only Lundy record and as the species is very similar to 32.015 *A. subpropinquella* it is possible that the record is a misidentification of that species.
32.018 (*688*) *Agonopterix heracliana* (L.): Carpenter; 1989; 1990.
32.030 (*706*) *Agonopterix nervosa* (Haworth): Longstaff; Palmer.
32.031 (*695*) *Agonopterix alstromeriana* (Clerck): 1989; 1990; 1995.
32.036 (*672*) *Depressaria radiella* (Goeze)
= *pastinacella* (Duponchel): 1988; 1992; 1995; 2008; 2011.
32.039 (*670*) *Depressaria daucella* ([D. & S.]): 1988.

GELECHIIDAE

35.016 (*839*) *Nothris congressariella* (Bruand): Hemsley, Alexander & Hearn: 3; 51–52; 99; Table 3, 'Larvae presumably of this species seen on foodplant very widely, but particularly at east end of Quarter Wall [in 1986]'; 1993; Key; 1997; 1998; 2001; 2003; 2011.
35.065 (*728*) *Monochroa cytisella* (Curtis): 1993.
35.082 (*731a*) *Eulamprotes immaculatella* (Douglas): one SS144437, 21.ix.2011 (genitalic confirmation) SDB & RJH.
35.109 (*822*) *Scrobipalpa acuminatella* (Sircom): 2011.
35.146 (*776*) *Teleiopsis diffinis* (Haworth): 2011.

COLEOPHORIDAE

37.015 (*493*) *Coleophora serratella* (L.): 1993; 2004.
37.022 (*504*) *Coleophora lusciniaepennella* (Treitschke): 2011.
37.044 (*547*) *Coleophora discordella* Zeller: 1993; 2001; 2003; 2008; 2011.
37.073 (*584*) *Coleophora alticolella* Zeller: 1987; 1990; 1992.
37.102 (*563*) *Coleophora argentula* (Stephens): 2011.
37.106 (*560*) *Coleophora paripennella* Zeller: 1988.

ELACHISTIDAE

38.004 (*610*) *Elachista argentella* (Clerck): Longstaff; Palmer.
38.030 (*601*) *Elachista albifrontella* (Hübner): Parfitt.
38.037 (*607*) *Elachista canapennella* (Hübner): 2011.
38.048 (*632*) *Elachista consortella* Stainton: 1993.

SCYTHRIDIDAE

43.002 (*911*) *Scythris grandipennis* (Haworth): a few larvae on *Ulex europaeus* L. Gorse (SS141441), 24.ix.2011 SDB & RJH.

ALUCITIDAE

44.001 (*1288*) *Alucita hexadactyla* L.: Chanter; Parfitt; Longstaff; Palmer; 1984; 1995.

PTEROPHORIDAE

[45.009 (*1503*) *Gillmeria ochrodactyla* ([D. & S.]): Chanter; Parfitt; Palmer. The larval foodplant, *Tanecetum vulgare* L. Tansy, does not occur on Lundy and so this is likely to be a misidentification, possibly of *G. pallidactyla* (Haworth, 1811) which has not been recorded from Lundy although its larval foodplant, *Achillea millefolium* L. Yarrow, does occur.]

45.030 (*1513*) *Pterophorus pentadactyla* (L.): 1988; 1989.
*45.035 (*1515*) *Wheeleria spilodactylus* (Curtis): Chanter; Parfitt; Longstaff; Palmer. As Parfitt and Palmer merely list the species and Longstaff refers to Heaven's record given by Chanter, it is probable that Heaven is the only person to have recorded it. Longstaff (1907: 243) states: 'It is quite possible that Mr. Heaven may have confounded this and the preceding [*Gillmeria ochrodactyla*] with commoner Plumes'. Its only British foodplant, *Marrubium vulgare* L. White Horehound, used to occur on Lundy but no longer does. It is understood that its eventual disappearance may have coincided with general 'tidying up' activities. The plant does not occur on the mainland of VC4. Although it does grow in a few areas on the south Devon coast *Wheeleria spilodactylus* has never been found there. Despite that, it is **just** possible that Heaven's record may be correct.
45.044 (*1524*) *Emmelina monodactyla* (L.): 1990.

SCHRECKENSTEINIIDAE
46.001 (*485*) *Schreckensteinia festaliella* (Hübner): 2011.

EPERMENIIDAE
47.005 (*483*) *Epermenia chaerophyllella* (Goeze): 2011; 2012.

CHOREUTIDAE
48.001 (*385*) *Anthophila fabriciana* (L.): 1983; 1986; 1992; 1993; 2002; 2011; 2012.
48.002 (*388*) *Prochoreutis myllerana* (F.) or 48.003 (*387*) *Prochoreutis sehestediana* (F.): 2011.
48.005 (*386*) *Tebenna micalis* (Mann): 2011.

TORTRICIDAE
49.013 (*977*) *Archips podana* (Scopoli): 1973; 1988; 1990; 1995.
49.024 (*969*) *Pandemis corylana* (F.): 1985.
49.025 (*970*) *Pandemis cerasana* (Hübner): 1995.
49.026 (*972*) *Pandemis heparana* ([D. & S.]): 1988; 1990; 2010.
49.029 (*1002*) *Lozotaenia forsterana* (F.): 1993 (MH).
49.059 (*1033*) *Tortrix viridana* L.: 1986; 1993 (MH).
49.062 (*1036*) *Acleris forsskaleana* (L.): 1989; 1990; 1995.
49.070 (*1042*) *Acleris rhombana* ([D. & S.]): 1987.
49.077 (*1048*) *Acleris variegana* ([D. & S.]): 1993.
49.078 (*1043*) *Acleris aspersana* (Hübner): Longstaff; Palmer.
49.080 (*1053*) *Acleris hastiana* (L.): 2011.
49.087 (*1061*) *Acleris literana* (L.): 1992, where it is given as '*Acleris ?literana*' and recorded 'in early October'. It is a distinctive species and the date would be right and so it is likely to be correct.
49.096 (*924*) *Hysterophora maculosana* (Haworth): 2000 & 2001; 2002 (BB).
49.109 (*937*) *Agapeta hamana* (L.): 1986; 1993 (MH); 1995; 1997.
49.111 (*954*) *Eupoecilia angustana* (Hübner): Longstaff; Palmer.
49.127 (*945*) *Aethes cnicana* (Westwood): 1988; 1989.
49.128 (*946*) *Aethes rubigana* (Treitschke): 1990; 1995.
49.139 (*966*) *Cochylis atricapitana* (Stephens): 1993; 2011; 2012.
49.146 (*1089*) *Apotomis semifasciana* (Haworth): 1990.
*49.151 (*1094*) *Apotomis capreana* (Hübner): Parfitt. Although *Salix* spp. Sallow species, the larval foodplants, occur on Lundy, this is a very local species in Devon with no other records from VC4. As Parfitt's is the only record we have traced, it should be treated with caution.
49.157 (*1082*) *Hedya pruniana* (Hübner): 1988.

49.166 (*1076*) *Celypha lacunana* ([D. & S.]): Longstaff; Palmer; 1987; 1988; 1990; 1993; 1997; 2000 & 2001.
49.185 (*1109*) *Lobesia littoralis* (Westwood & Humphreys): 1992; 2004.
49.194 (*1111*) *Bactra lancealana* (Hübner): Longstaff; Palmer; 1984; 1990; 1993; 1995; 2000 & 2001.
49.224 (*1205*) *Spilonota ocellana* ([D. & S.]): 1990.
*49.233 (*1156*) *Epinotia solandriana* (L.): Parfitt. It is curious that this is the only record we have traced, because the species occurs in both VCs 3 and 4.
49.260 (*1165*) *Zeiraphera isertana* (F.): 1993.
49.265 (*1201*) *Eucosma cana* (Haworth): 1988.
*49.281 (*1168*) *Gypsonoma sociana* (Haworth): 1988. The very similar *G. dealbana* (Frölich) does not appear to have been recorded from Lundy. This is the more common species in Devon.
49.285 (*1184*) *Epiblema scutulana* ([D. & S.]): 1987; 2004.
49.292 (*1174*) *Notocelia cynosbatella* (L.): 1996.
49.294 (*1175*) *Notocelia uddmanniana* (L.): 1973; 1993; 1995; 2010.
49.295 (*1178*) *Notocelia roborana* ([D. & S.]): 1995.
49.304 (*1207*) *Clavigesta purdeyi* (Durrant): 1990.
49.305 (*1210*) *Rhyacionia buoliana* ([D. & S.]): 1988; 1993; 1995.
49.309 (*1285*) *Dichrorampha plumbana* (Scopoli): 1984.
49.321 (*1273*) *Dichrorampha petiverella* (L.): Longstaff; Palmer; 1997.
49.322 (*1276*) *Dichrorampha plumbagana* (Treitschke): 1996.
49.325 (*1255*) *Cydia ulicetana* (Haworth)
= *succedana* sensu auctt.: Longstaff; Palmer; 1993 (RJH); 2000 & 2001; 2004; 2012.
49.367 (*1236*) *Pammene fasciana* (L.): 1990.
49.371 (*1239*) *Pammene rhediella* (Clerck): larvae in spun leaves of *Prunus spinosa* L. Blackthorn 8.vii.1993, moths reared in 1994 RJH.

COSSIDAE
50.002 (*161*) *Zeuzera pyrina* (L.) Leopard Moth: 2009.

SESIIDAE
52.016 (*383*) *Pyropteron muscaeformis* (Esper) Thrift Clearwing: Longstaff; Bristowe; Palmer; 1983; Hemsley, Alexander & Hearn: 78; Table 3, '1985 Hyman/D. Wedd (p.c.)'; 1997; 2000 & 2001; 2002; 2004; 2005; 2008; 2009; 2011; 2012.

ZYGAENIDAE
54.008 (*169*) *Zygaena filipendulae* (L.) Six-spot Burnet: Chanter; Parfitt; Martineau; Longstaff; 1972; 1973; 1991; 2008; 2009; 2010.
54.010 (*170*) *Zygaena trifolii* (Esper) Five-spot Burnet: Chanter; Parfitt; Martineau; 1990; 1991; 1992; 1993; 1995–1997; 1999–2012.

PYRALIDAE
62.001 (*1428*) *Aphomia sociella* (L.): 1990; 1993 (MH).
62.023 (*1442*) *Pempelia palumbella* ([D. & S.]): 1993 (MH); 2011.
62.058 (*1483*) *Phycitodes binaevella* (Hübner): 1993 (MH).
62.059 (*1484*) *Phycitodes saxicola* (Vaughan): 2011.
62.077 (*1424*) *Endotricha flammealis* ([D. & S.]): Parfitt; 1989; 1990; 1993; 1995; 1997.

CRAMBIDAE
63.003 (*1367*) *Pyrausta cingulata* (L.): 1985.
63.005 (*1365*) *Pyrausta despicata* (Scopoli): 1987; 1990; 1995.
63.018 (*1378*) *Anania coronata* (Hufnagel): 1993 (MH).

63.021 (*1379*) *Anania terrealis* (Treitschke): 1990; 1993.
63.022 (*1385*) *Anania crocealis* (Hübner): 2011.
63.025 (*1376*) *Anania hortulata* (L.): 1993 (MH); 2002; 2009; 2010.
63.031 (*1395*) *Udea ferrugalis* (Hübner): 1990; 1995; 1996; 2002; 2006–2008; 2011.
63.034 (*1390*) *Udea prunalis* ([D. & S.]): 1990; 1993 (MH).
63.037 (*1392*) *Udea olivalis* ([D. & S.]): 1993 (MH); 2010.
63.038 (*1405*) *Pleuroptya ruralis* (Scopoli): 1973; 1993 (MH); 1995.
63.050 (*1399*) *Dolicharthria punctalis* ([D. & S.]): 1988; 1995.
63.052 (*1398*) *Nomophila noctuella* ([D. & S.]): 1986; 1987; 1995; 1996; 1998–2003 ; 2006; 2007; 2009; 2012.
63.060 (*1358*) *Evergestis pallidata* (Hufnagel): Parfitt.
63.064 (*1334*) *Scoparia ambigualis* (Treitschke): 2000 & 2001.
63.066 (*1333*) *Scoparia pyralella* ([D. & S.]): Longstaff; Palmer.
63.067 (*1338*) *Eudonia lacustrata* (Panzer): 1990; 1995; 1997; 2010.
[63.068 (*1339*) *Eudonia murana* (Curtis): 1987. There is no authentic record of the species in Devon and it probably does not occur in southern England (Heckford & Sterling, 2000: 19–20). Therefore, this is almost certainly a misidentification of 63.073 *Eudonia truncicolella* which is very similar macroscopically.]
63.069 (*1342*) *Eudonia angustea* (Curtis): 1985; 1990; 2000 & 2001; 2004; 2006; 2008; 2011; 2012.
63.072 (*1343*) *Eudonia delunella* (Stainton): Parfitt; 1985; 1990.
63.073 (*1340*) *Eudonia truncicolella* (Stainton): 1993 (MH).
63.074 (*1344*) *Eudonia mercurella* (L.): Longstaff; Palmer; 1990; 1993 (MH); 1995.
63.080 (*1293*) *Chrysoteuchia culmella* (L.): Longstaff; Palmer; 1988; 1990; 1993; 1997.
63.081 (*1294*) *Crambus pascuella* (L.): Parfitt; 1990.
[63.085 (*1300*) *Crambus pratella* (L.): Longstaff; Palmer; 1984. Apart from these records, *C. pratella* has never been recorded from Devon. They are all, probably, records of 63.086 *Crambus lathoniellus*. The specific name '*pratella*' was for a long time wrongly used for this latter species.]
*63.086 (*1301*) *Crambus lathoniellus* (Zincken): see 63.085 *C. pratella* above.
63.088 (*1302*) *Crambus perlella* (Scopoli): Longstaff; Palmer; 1984; 1990.
63.089 (*1305*) *Agriphila tristella* ([D. & S.]): 1985; 1995.
63.093 (*1304*) *Agriphila straminella* ([D. & S.]): 1989; 1990; 1993 (MH); 1995; 1997.
63.095 (*1309*) *Agriphila geniculea* (Haworth): Longstaff; Palmer; 1986; 1990; 1995.
63.099 (*1313*) *Catoptria pinella* (L.): 1995.
63.100 (*1314*) *Catoptria margaritella* ([D. & S.]): 1995.
63.114 (*1345*) *Elophila nymphaeata* (L.): Longstaff; Palmer.

DREPANIDAE
65.007 (*1651*) *Cilix glaucata* (Scopoli) Chinese Character: 1973; 1990; 1995; 2011.
65.009 (*1653*) *Habrosyne pyritoides* (Hufnagel) Buff Arches: 2009.
65.010 (*1654*) *Tethea ocularis* (L.) Figure of Eighty: 1992.

LASIOCAMPIDAE
66.003 (*1634*) *Malacosoma neustria* (L.) Lackey: 1986; 1987; 1993 (MH); 1999; 2002.
[66.004 (*1635*) *Malacosoma castrensis* (L.) Ground Lackey: Chanter; Parfitt; Longstaff. Parfitt merely lists the species. Longstaff (1907: 243) states: 'It seems reasonable to assume that Mr. Heaven has made a mistake, and that the insect which he saw was really *C. neustria*, Linn., . . .'. *M. castrensis* is a salt marsh species confined to eastern England, except for an area at Axmouth on the south Devon coast where it was discovered in 1995 and whose origin is a matter of speculation. Lundy has no salt marsh. The record is clearly erroneous.]

*66.006 (*1636*) *Lasiocampa trifolii* ([D. & S.]) Grass Eggar: Parfitt; 2010, given in a list of 'Diurnal (day-flying) moths' as '1636 **Grass Eggar** *Lasiocampa trifolii* or **1637 Oak Eggar** *Lasiocampa quercus*/A pair was watched mating near the Earthquake on 19 Jul: "After separating the male quivered his wings for about a minute and then flew off, leaving the female behind" '. *L. trifolii* has not otherwise recorded from VC4 and in VC3 it is found mainly on the south coast. Also, it flies after sunset whereas the male of *L. quercus* flies during the day. Thus, these may be misidentifications of *L. quercus*.
66.007 (*1637*) *Lasiocampa quercus* (L.) Oak Eggar: Chanter; Parfitt; Longstaff; Palmer; Smith; 1973; 1986–1988; 1990–1992; 1993 (MH); 1994; 1995 (HW); 1996; 1997; 2000 & 2001; 2003; 2005–2011.
66.008 (*1638*) *Macrothylacia rubi* (L.) Fox Moth: Martineau; Longstaff; Palmer; 1964 (TJW); 1972; 1973; 1984; 1986–1997; 1999–2002; 2005–2012.
66.010 (*1640*) *Euthrix potatoria* (L.) Drinker: 1993; 1996; 1999.

ENDROMIDAE
[67.001 (*1644*) *Endromis versicolora* (L.) Kentish Glory: Chanter; Parfitt; Longstaff; Palmer. As Parfitt and Palmer merely list the species and Longstaff refers to Heaven's record given by Chanter, it seems that Heaven is the only person to have recorded it. There are a few, very old, Devon records, if they are correct. It is certainly very difficult to believe that the species ever occurred on Lundy, although as Longstaff (1907: 242) states: 'It is not easy to see how Mr. Heaven could have failed to identify this correctly, supposing that he actually caught the insect and compared it with a figure. But it seems a strange locality for the moth.']

SATURNIIDAE
68.001 (*1643*) *Saturnia pavonia* (L.) Emperor Moth: Chanter; Parfitt; Longstaff; Palmer; 1980; 1981; 1992–2012.

SPHINGIDAE
69.003 (*1981*) *Laothoe populi* (L.) Poplar Hawk-moth: Chanter; Parfitt; Longstaff; Palmer; 1993 (MH).
69.004 (*1972*) *Agrius convolvuli* (L.) Convolvulus Hawk-moth: Chanter; Parfitt; Longstaff; Palmer; 1950; 1968; 1973; 1987; 1991; 2003; 2006.
69.005 (*1973*) *Acherontia atropos* (L.) Death's-head Hawk-moth: Chanter; Parfitt; Longstaff; Palmer; 1990; 2009.
69.010 (*1984*) *Macroglossum stellatarum* (L.) Humming-bird Hawk-moth: Chanter; Longstaff; Palmer; Dannreuther; 1948; 1950; 1973; 1984–1986; 1988–1992; 1995–1998; 2000 & 2001; 2003–2012.
69.016 (*1991*) *Deilephila elpenor* (L.) Elephant Hawk-moth: 1992; 1995.

GEOMETRIDAE
70.009 (*1709*) *Idaea subsericeata* (Haworth) Satin Wave: 1968.
70.011 (*1708*) *Idaea dimidiata* (Hufnagel) Single-dotted Wave: 1968; 1990; 1993 (MH); 2009.
70.013 (*1702*) *Idaea biselata* (Hufnagel) Small Fan-footed Wave: Longstaff; Palmer; 1987; 1989; 1990; 1993 (MH); 1995.
70.016 (*1713*) *Idaea aversata* (L.) Riband Wave: 1968; 1973; 1990; 1993 (MH); 1995; 1999; 2010.
70.023 (*1689*) *Scopula marginepunctata* (Goeze) Mullein Wave: Longstaff; 1968; 1973; 1987; 1989; 1990; 1993 (MH); 1995; 1996; 2011; 2012.
70.024 (*1690*) *Scopula imitaria* (Hübner) Small Blood-vein: Palmer; 1968; 1973; 1993 (MH); 1995.

70.025 (*1692*) *Scopula immutata* (L.) Lesser Cream Wave: 1968; 1995.
70.029 (*1682*) *Timandra comae* Schmidt Blood-vein: 1984.
70.041 (*1734*) *Scotopteryx luridata* (Hufnagel) July Belle: 1968; 2009.
70.045 (*1732*) *Scotopteryx chenopodiata* (L.) Shaded Broad-bar: Longstaff.
[70.048 (*1723*) *Xanthorhoe decoloraria* (Esper) Red Carpet: Parfitt. This is a species that does not occur in southern Britain and so is a misidentification.]
70.049 (*1728*) *Xanthorhoe fluctuata* (L.) Garden Carpet: Parfitt; Walker; Longstaff; 1988; 1995; 2002; 2007; 2010–2012.
70.051 (*1724*) *Xanthorhoe spadicearia* ([D. & S.]) Red Twin-spot Carpet: Longstaff; 1986; 1990; 1995; 2011, recorded as this or 70.052 *Xanthorhoe ferrugata*.
*70.052 (*1725*) *Xanthorhoe ferrugata* (Clerck) Dark-barred Twin-spot Carpet: 2011, recorded as this or 70.051 *Xanthorhoe spadicearia*.
70.054 (*1727*) *Xanthorhoe montanata* ([D. & S.]) Silver-ground Carpet: 1951; 1968; 1973; 2011.
70.059 (*1742*) *Camptogramma bilineata* (L.) Yellow Shell: Walker; Longstaff; 1951; 1968; 1973; 1986–1988; 1990; 1991; 1993 (MH); 1995; 1997; 1999–2003; 2006; 2007; 2011; 2012.
70.061 (*1738*) *Epirrhoe alternata* (Müller) Common Carpet: Longstaff; 1995.
70.074 (*1777*) *Hydriomena furcata* (Thunberg) July Highflyer: 1973; 1990; 1993 (MH); 1995.
70.075 (*1778*) *Hydriomena impluviata* ([D. & S.]) May Highflyer: 2011.
70.079 (*1769*) *Thera britannica* (Turner) Spruce Carpet: 2010.
70.081 (*1768*) *Thera obeliscata* (Hübner) Grey Pine Carpet: 2007; 2009.
70.087 (*1752*) *Cosmorhoe ocellata* (L.) Purple Bar: Parfitt; Longstaff; 1973; 1990; 1993 (MH); 2009; 2012.
70.090 (*1755*) *Eulithis testata* (L.) Chevron: 2010.
*70.092 (*1757*) *Eulithis mellinata* (F.) Spinach: Chanter. Longstaff (1907) comments that: 'It is, however, not unlikely that it has been confounded with *E. dotata*, Linn. (*pyraliata*, Fabr.) which Barrett says is generally distributed in Devon . . .'. *E. mellinata* is a rare and declining species in Devon. Parfitt confusingly lists 'The Spinach Cidaria dotata (spinachiata [*sic*], *Haw.*)'. *Cidaria dotata* (L.) is a junior synonym of *Eulithis populata* (L.) Northern Spinach, but Haworth's *spinaciata* is a junior synonym of *E. mellinata*.
70.094 (*1759*) *Ecliptopera silaceata* ([D. & S.]) Small Phoenix: 1995.
70.095 (*1760*) *Chloroclysta siterata* (Hufnagel) Red-green Carpet: 2006.
70.097 (*1764*) *Dysstroma truncata* (Hufnagel) Common Marbled Carpet: Longstaff; 1988; 1999; 2000 & 2001; 2006; 2007; 2009–2012.
70.098 (*1762*) *Dysstroma citrata* (L.) Dark Marbled Carpet: 2010.
70.100 (*1776*) *Colostygia pectinataria* (Knoch) Green Carpet: 2012.
70.106 (*1799*) *Operophtera brumata* (L.) Winter Moth: 2007.
70.123 (*1790*) *Triphosa dubitata* (L.) Tissue: 1986, two recorded between 11 and 12 August 1986. One of the larval foodplants, *Rhamnus cathartica* L. Buckthorn, does not grow on Lundy and there may be only one bush of the other, *Frangula alnus* Mill., Alder Buckthorn, on Lundy. The moth occurs in both VCs 3 and 4 but is local and rare.
70.132 (*1802*) *Perizoma affinitata* (Stephens) Rivulet: 1993 (MH); 1995; 2010.
70.133 (*1803*) *Perizoma alchemillata* (L.) Small Rivulet: 1968; 1990; 1995.
70.141 (*1862*) *Gymnoscelis rufifasciata* (Haworth) Double-striped Pug: 1988; 1990.
70.144 (*1860*) *Pasiphila rectangulata* (L.) Green Pug: 1995.
70.147 (*1811*) *Eupithecia tenuiata* (Hübner) Slender Pug: 1995.
70.151 (*1817*) *Eupithecia pulchellata* Stephens Foxglove Pug: 1968; 1986; 1990; 1993

(MH); 1995; 2009.
[70.156 (*1852*) *Eupithecia abbreviata* Stephens Brindled Pug: 1968, where it is published as '*Eupithecia abbreviata*(?)' and recorded during the period '6–9 July 1968'. As the moth occurs in April and May, the question mark seems appropriate.]
70.168 (*1846*) *Eupithecia nanata* (Hübner) Narrow-winged Pug: Longstaff; 1951; 1986; 2009; 2010.
70.172 (*1843*) *Eupithecia distinctaria* Herrich-Schäffer Thyme Pug: 1968; 1987; 1993 (MH).
70.173 (*1825*) *Eupithecia centaureata* ([D. & S.]) Lime-speck Pug: Longstaff; 1990; 2009; 2010; 2012.
70.179 (*1830*) *Eupithecia absinthiata* (Clerck) Wormwood Pug: 1990.
70.180 (*1833*) *Eupithecia expallidata* Doubleday Bleached Pug: 1990; 1995.
70.183 (*1834*) *Eupithecia vulgata* (Haworth) Common Pug: 1988; 2012.
70.184 (*1819*) *Eupithecia exiguata* (Hübner) Mottled Pug: 2000 & 2001.
70.185 (*1836*) *Eupithecia denotata jasioneata* Crewe Jasione Pug: 2012.
70.192 (*1867*) *Aplocera plagiata* (L.) Treble-bar: 1951; 2011.
70.205 (*1884*) *Abraxas grossulariata* (L.) Magpie: Chanter; Parfitt; Longstaff; 1973; 1980; 1987; 1988; 1991; 1992; 1993 (MH); 1994; 1995; 2009; 2011.
70.207 (*1887*) *Lomaspilis marginata* (L.) Clouded Border: 1993 (MH).
70.212 (*1890*) *Macaria alternata* ([D. & S.]) Sharp-angled Peacock: 1973.
70.222 (*1902*) *Petrophora chlorosata* (Scopoli) Brown Silver-line: 1973; 1988; 1990; 1992; 1994; 1996–2012.
70.226 (*1906*) *Opisthograptis luteolata* (L.) Brimstone Moth: Chanter; Parfitt; Longstaff; 1968; 1973; 1986; 1987; 1990; 1992; 1995; 2000 & 2001; 2010–2012.
*70.233 (*1912*) *Ennomos quercinaria* (Hufnagel) August Thorn: Parfitt. Although widespread in both VCs 3 and 4, it is curious that there are no other records.
*70.234 (*1913*) *Ennomos alniaria* (L.) Canary-shouldered Thorn: Chanter; Parfitt; Longstaff. Although common in both VCs 3 and 4, it is curious that there are no other records. Indeed, as Parfitt and Palmer merely list the species and Longstaff refers to Heaven's record given by Chanter, it is probable that Heaven is the only person to have recorded it.
70.237 (*1917*) *Selenia dentaria* (F.) Early Thorn: 1990; 1993 (MH); 1995; 1998; 2000 & 2001; 2006; 2011.
70.239 (*1919*) *Selenia tetralunaria* (Hufnagel) Purple Thorn: 1990.
70.240 (*1920*) *Odontopera bidentata* (Clerck) Scalloped Hazel: 1990; 1996; 2012.
70.241 (*1921*) *Crocallis elinguaria* (L.) Scalloped Oak: Longstaff; 1973; 1986; 1990; 1993 (MH); 1995; 2009; 2012.
70.243 (*1922*) *Ourapteryx sambucaria* (L.) Swallow-tailed Moth: 1973.
70.244 (*1923*) *Colotois pennaria* (L.) Feathered Thorn: 1988; 2006.
70.252 (*1931*) *Biston betularia* (L.) Peppered Moth: 1990; 1991; 1992; 1993 (MH); 1995; 2006.
*70.257 (*1936*) *Menophra abruptaria* (Thunberg) Waved Umber: Chanter; Parfitt; Palmer. Although widespread in both VCs 3 and 4, but more local in VC4, it is curious that there are no other records. Indeed, as Parfitt and Palmer merely list the species and Longstaff refers to Heaven's record given by Chanter, it is probable that Heaven is the only person to have recorded it.
70.258 (*1937*) *Peribatodes rhomboidaria* ([D. & S.]) Willow Beauty: 1968; 1973; 1990; 1993 (MH); 1995.
70.265 (*1941*) *Alcis repandata* (L.) Mottled Beauty: Parfitt; 1968; 1973; 1987; 1988; 1989; 1990; 1991; 1993 (MH); 1995; 2010.
70.270 (*1947*) *Ectropis crepuscularia* ([D. & S.]) Engrailed: 1995.

70.280 (*1958*) *Lomographa temerata* ([D. & S.]) Clouded Silver: 1951; 1968; 1973; 1995 (HW); 2010.
70.283 (*1961*) *Campaea margaritaria* (L.) Light Emerald: 1990; 1993 (MH); 1995; 2008; 2010.
70.287 (*1964*) *Charissa obscurata* ([D. & S.]) Annulet: Parfitt; 1986; 1987; 1993 (MH).
70.288 (*1945*) *Cleorodes lichenaria* (Hufnagel) Brussels Lace: 1968; 1973; 1987; 1990; 2010.
70.303 (*1674*) *Jodis lactearia* (L.) Little Emerald: 1968; 1973.
70.305 (*1669*) *Hemithea aestivaria* (Hübner) Common Emerald: 1993 (MH); 2010; 2011.

NOTODONTIDAE
71.003 (*1995*) *Cerura vinula* (L.) Puss Moth: 1950.
*71.012 (*2000*) *Notodonta dromedarius* (L.) Iron Prominent: Chanter; Parfitt; Longstaff; Palmer. Although common in both VCs 3 and 4, it is curious that there are no other records. Indeed, as Parfitt and Palmer merely list the species and Longstaff refers to Heaven's record given by Chanter, it is probable that Heaven is the only person to have recorded it.
70.020 (*2011*) *Pterostoma palpina* (Clerck) Pale Prominent: 1995.
70.025 (*1994*) *Phalera bucephala* (L.) Buff-tip: Chanter; Parfitt; Longstaff; Palmer; 1968; 1989; 1990; 1993 (MH); 1999; 2005; 2006; 2009–2012.

EREBIDAE
72.001 (2469) *Scoliopteryx libatrix* (L.) Herald: 2010.
72.003 (*2477*) *Hypena proboscidalis* (L.) Snout: 1968; 1990; 1992; 1995; 2010; 2011.
*72.012 (*2029*) *Euproctis chrysorrhoea* (L.) Brown-tail: Parfitt. There are few VC4 records. It is more likely that Parfitt's record is of 72.013 *Euproctis similis*, which he did not list.
72.013 (*2030*) *Euproctis similis* (Fuessly) Yellow-tail: 1995.
72.015 (*2028*) *Calliteara pudibunda* (L.) Pale Tussock: 2004; 2006-2011.
72.019 (*2061*) *Spilosoma lutea* (Hufnagel) Buff Ermine: 1968; 1973; 1990; 1992; 1995; 1993 (MH); 1995 (HW): 2004; 2008–2012.
72.020 (*2060*) *Spilosoma lubricipeda* (L.) White Ermine: 1968; 1973; 1984; 1988–1990; 1992; 2002; 2006; 2007; 2009–2012.
72.022 (*2063*) *Diaphora mendica* (Clerck) Muslin Moth: 1951; 1973.
72.024 (*2064*) *Phragmatobia fuliginosa* (L.) Ruby Tiger: Longstaff; Palmer; Smith; 1987; 1988; 1992; 1994–2000 & 2001; 2007–2012.
72.026 (*2057*) *Arctia caja* (L.) Garden Tiger: Chanter; Parfitt; Palmer; 1973; 1987; 1993 (MH); 1994–1999; 2002–2012.
72.027 (*2058*) *Arctia villica* (L.) Cream-spot Tiger: Parfitt; Longstaff; Palmer; 1951; 1968; 1973; 1983; 1985–2004; 2006–2012.
72.029 (*2068*) *Callimorpha dominula* (L.) Scarlet Tiger: 1987.
72.030 (*2067*) *Euplagia quadripunctaria* (Poda) Jersey Tiger: 2005.
72.031 (*2069*) *Tyria jacobaeae* (L.) Cinnabar: 1996; 1998; 2007–2011.
72.034 (*2054*) *Utetheisa pulchella* (L.) Crimson Speckled: 1992.
72.045 (*2050*) *Eilema lurideola* (Zincken) Common Footman: 1973; 1986; 1987; 1989; 1990; 1993 (MH); 1995; 1997; 2011.
72.046 (*2047*) *Eilema complana* (L.) Scarce Footman 1986; 1987.
72.047 (*2045*) *Eilema caniola* (Hübner) Hoary Footman: Longstaff; Palmer.
72.049 (*2043*) *Eilema sororcula* (Hufnagel) Orange Footman: 1986; 1987.
72.053 (*2489*) *Herminia tarsipennalis* Treitschke Fan-foot: 1989; 1993 (MH); 2010.
72.084 (*2462*) *Euclidia mi* (Clerck) Mother Shipton: 2004.

NOCTUIDAE

73.001 (*2450*) *Abrostola tripartita* (Hufnagel) Spectacle: Parfitt; 1968; 1973; 1992; 1993 (MH); 1995; 2009-2011.
73.012 (*2434*) *Diachrysia chrysitis* (L.) Burnished Brass: Carpenter.
73.015 (*2441*) *Autographa gamma* (L.) Silver Y: Chanter; Parfitt; Longstaff; Palmer; Dannreuther; 1948; 1968; 1973; 1985-2012.
73.016 (*2442*) *Autographa pulchrina* (Haworth) Beautiful Golden Y: 2010.
73.017 (*2443*) *Autographa jota* (L.) Plain Golden Y: 1987.
73.021 (*2447*) *Syngrapha interrogationis* (L.) Scarce Silver Y: Hemsley, Alexander & Hearn: 41; Table 3, '1987 (one) D. Wedd (p.c.)'. This is the only VC4 record and the few VC3 records may be doubtful. It was almost certainly an immigrant.
73.038 (*2284*) *Acronicta psi* (L.) Grey Dagger: Parfitt; 1989.
73.045 (*2289*) *Acronicta rumicis* (L.) Knot Grass: Longstaff; Palmer; 1968; 1973; 1987; 1989; 1990; 1992; 1993 (MH); 1995; 2000 & 2001; 2009-2012.
73.058 (*2221*) *Cucullia verbasci* (L.) Mullein: 2011.
73.061 (*2394*) *Stilbia anomala* (Haworth) Anomalous: 1973.
73.062 (*2297*) *Amphipyra pyramidea* (L.) Copper Underwing: 1995.
73.069 (*2243*) *Xylocampa areola* (Esper) Early Grey: 1998.
73.074 (*2403*) *Heliothis peltigera* ([D. & S.]) Bordered Straw: 1968.
73.085 (*2295*) *Nyctobrya muralis* (Forster) Marbled Green: Chanter; Parfitt; Longstaff; Palmer; 1995; 2011.
73.087 (*2385*) *Spodoptera exigua* (Hübner) Small Mottled Willow: 1986.
[73.091 (*2396*) *Elaphria venustula* (Hübner) Rosy Marbled: 1986, given as 'present' between 11 and 12 August 1986. The record is attributed to 'D. J. Wedd *et al*' but David Wedd (*in litt.*) tells us that he never saw the species. It has not otherwise been recorded from Devon and the nearest county from which it is known is Hampshire. The moth flies from late May to early July. It is undoubtedly an error, the source of which cannot be traced.]
73.095 (*2389*) *Caradrina clavipalpis* (Scopoli) Pale Mottled Willow: 1988; 2002.
73.096 (*2381*) *Hoplodrina octogenaria* (Goeze) Uncertain: 1990; 1993 (MH); 2009; 2010.
73.097 (*2382*) *Hoplodrina blanda* ([D. & S.]) Rustic: 1968; 1973; 1987; 1990; 1993 (MH); 1995.
73.099 (*2384*) *Hoplodrina ambigua* ([D. & S.]) Vine's Rustic: 1990.
73.101 (*2380*) *Charanyca trigrammica* (Hufnagel) Treble Lines: 2011.
73.102 (*2302*) *Rusina ferruginea* (Esper) Brown Rustic: 1968.
73.109 (*2303*) *Thalpophila matura* (Hufnagel) Straw Underwing: Longstaff; Palmer. A very local and uncommon species in Devon, but a distinctive species and so the record is likely to be correct.
73.113 (*2306*) *Phlogophora meticulosa* (L.) Angle Shades: 1968; 1987–1990; 1992; 1997; 2000 & 2001; 2002; 2004–2011.
73.114 (*2305*) *Euplexia lucipara* (L.) Small Angle Shades: 1968; 1973; 1990; 1993 (MH); 1995 (HW); 2006; 2009; 2010.
73.121 (*2364*) *Gortyna flavago* ([D. & S.]) Frosted Orange: 1992; 2010; 2011.
73.123 (*2361*) *Hydraecia micacea* (Esper) Rosy Rustic: 1951; 1986; 1987; 2010; 2011.
73.131 (*2353*) *Luperina testacea* ([D. & S.]) Flounced Rustic: Longstaff; Palmer; 1973; 1986; 1988; 2002; 2010; 2011.
73.141 (*2371*) *Archanara dissoluta* (Treitschke) Brown-veined Wainscot: Hemsley, Alexander & Hearn: 99; Table 3, '1987 "occasional" D. Wedd (p.c.)'. This was the only VC4 record until 2006; in VC3 it is mainly coastal. The larval foodplant, *Phragmites australis* (Cav.) Trin. ex Steud. Common Reed, does not grown on

Lundy and so the records are probably of wanderers from the mainland.
73.142 (*2379*) *Coenobia rufa* (Haworth) Small Rufous: 2011.
73.144 (*2350*) *Denticucullus pygmina* (Haworth) Small Wainscot: 1995; 2010; 2011.
73.154 (*2330*) *Apamea remissa* (Hübner) Dusky Brocade: 1968.
73.156 (*2326*) *Apamea crenata* (Hufnagel) Clouded-bordered Brindle: 1968; 1992. (Parfitt gives 'The Clouded-bordered Brindle Axylia putris'; it is unclear whether he was referring to this species or 73.328 *Axylia putris* Flame).
73.158 (*2334*) *Apamea sordens* (Hufnagel) Rustic Shoulder-knot: Parfitt.
73.162 (*2321*) *Apamea monoglypha* (Hufnagel) Dark Arches: 1968; 1973; 1986-1990 ; 1993 (MH); 1995; 1997; 2002; 2003; 2007; 2009–2012.
73.163 (*2322*) *Apamea lithoxylaea* ([D. & S.]) Light Arches: 1968; 1973; 1987.
*73.169 (*2343*) *Mesapamea secalis* (L.) Common Rustic: 1973; 1990; 1993 (MH); 1995; 1999. As far as we are aware no specimens of this or the following species have been dissected to confirm the identifications recorded. It is likely that both occur on Lundy but genitalic determinations are desirable.
*73.170 (*2343a*) *Mesapamea didyma* (Esper) Lesser Common Rustic: 1993 (MH). See comments about *M. secalis*.
73.171 (*2342*) *Litoligia literosa* (Haworth) Rosy Minor: 1973; 1988; 1993 (MH); 1995; 2009; 2011.
73.172 (*2341*) *Mesoligia furuncula* ([D. & S.]) Cloaked Minor: Carpenter; 1987; 1990; 2012.
*73.173 (*2337*) *Oligia strigilis* (L.) Marbled Minor: 1968 [scientific name followed by a question mark]; 1973; 1992; 2009; 2010. As far as we are aware no specimens of this or the following species have been dissected to confirm the identifications recorded. It is likely that both occur on Lundy but genitalic determinations are desirable. Indeed, it is also likely that *O. latruncula* ([D. & S.]) Tawny Marbled Minor occurs on the island.
*73.175 (*2338*) *Oligia versicolor* (Borkhausen) Rufous Minor: 1989. See comments about *O. strigilis*.
73.176 (*2340*) *Oligia fasciuncula* (Haworth) Middle-barred Minor: 1968; 1973; 1989; 1992; 2009; 2010.
73.186 (*2267*) *Agrochola lychnidis* ([D. & S.]) Beaded Chestnut: 1990; 2002; 2007.
73.189 (*2263*) *Agrochola lota* (Clerck) Red-line Quaker: 2006.
73.190 (*2264*) *Agrochola macilenta* (Hübner) Yellow-line Quaker: 2011.
73.192 (*2262*) *Agrochola circellaris* (Hufnagel) Brick: 2006.
73.193 (*2270*) *Omphaloscelis lunosa* (Haworth) Lunar Underwing: 1986; 1988; 1990–1992; 1999–2003; 2005–2008; 2010–2012.
73.209 (*2241*) *Xylena vetusta* (Hübner) Red Sword-grass: 2011.
73.216 (*2318*) *Cosmia trapezina* (L.) Dun-bar: 1990.
73.220 (*2225*) *Brachylomia viminalis* (F.) Minor Shoulder-knot: 1990; 1995.
73.233 (*2232*) *Aporophyla nigra* (Haworth) Black Rustic: 1988; 2000 & 2001; 2006; 2008; 2011.
73.234 (*2229*) *Dasypolia templi* (Thunberg) Brindled Ochre: 2006.
73.235 (*2255*) *Polymixis lichenea* (Hübner) Feathered Ranunculus: Longstaff; Palmer; 1988; 1992; 2000 & 2001; 2002; 2006; 2008; 2011.
73.237 (*2252*) *Polymixis flavicincta* ([D. & S.]) Large Ranunculus: 1988; 2011.
*73.238 (*2250*) *Mniotype adusta* (Esper) Dark Brocade: 1988. This is a very local species in Devon, with few confirmed records.
73.244 (*2187*) *Orthosia cerasi* (F.) Common Quaker: 1990; 2011; 2012.
73.249 (*2190*) *Orthosia gothica* (L.) Hebrew Character: 1990; 1995 (HW); 1998; 2006; 2011.

73.252 (*2177*) *Tholera cespitis* ([D. & S.]) Hedge Rustic: Longstaff; Palmer; 1992.
73.254 (*2176*) *Cerapteryx graminis* (L.) Antler Moth: Carpenter; Dannreuther; 1951; 1968; 1973; 1986; 1987; 1989-1992; 1993 (MH); 1995; 2002; 2009; 2011; 2012.
73.255 (*2145*) *Anarta trifolii* (Hufnagel) Nutmeg: 2011.
73.264 (*2158*) *Lacanobia thalassina* (Hufnagel) Pale-shouldered Brocade: 1986.
*73.265 (*2156*) *Lacanobia contigua* ([D. & S.]) Beautiful Brocade: Parfitt. This is a very local species in Devon.
73.267 (*2160*) *Lacanobia oleracea* (L.) Bright-line Brown-eye: 1968; 1973; 1982; 1986–1990; 1993 (MH); 1995; 1996; 2006; 2007; 2009–2012.
73.271 (*2163*) *Ceramica pisi* (L.) Broom Moth: Parfitt; Longstaff; Palmer; Smith; 1968; 1973; 1984; 1989; 1992; 1993 (MH); 1995; 2010; 2012.
73.273 (*2147*) *Hada plebeja* (L.) Shears: Wollaston; Longstaff; Palmer; 1968; 1990; 1995; 2009.
73.274 (*2154*) *Mamestra brassicae* (L.) Cabbage Moth: Parfitt; 1968; 1973; 1990; 1993 (MH).
73.278 (*2169*) *Conisania andalusica barrettii* (Doubleday) Barrett's Marbled Coronet: Hemsley, Alexander & Hearn: 78; Table 3, '1986 D. Wedd (p.c.)'. 2010; 2012.
73.279 (*2164*) *Hecatera bicolorata* (Hufnagel) Broad-barred White: Longstaff; Palmer; 1987.
73.281 (*2173*) *Hadena bicruris* (Hufnagel) Lychnis: 1990; 2011; 2012.
73.283 (*2171*) *Hadena confusa* (Hufnagel) Marbled Coronet: Longstaff; 1987; 1993 (MH); 1995 (HW); 1998; 2009–2012.
73.286 (*2167*) *Hadena perplexa perplexa* ([D. & S.]) Tawny Shears: 2012.
73.288 (*2191*) *Mythimna turca* (L.) Double Line: 2009.
73.291 (*2199*) *Mythimna pallens* (L.) Common Wainscot: 1987; 1988; 1995; 2009.
73.293 (*2198*) *Mythimna impura* (Hübner) Smoky Wainscot: 1973; 1986; 1987; 1990; 1993 (MH); 1995; 2009.
73.295 (*2195*) *Mythimna vitellina* (Hübner) Delicate: 2006; 2007.
73.297 (*2194*) *Mythimna albipuncta* ([D. & S.]) White-point: 2009.
73.298 (*2193*) *Mythimna ferrago* (F.) Clay: 1968; 1987; 1990; 1993 (MH); 1995; 2010.
73.300 (*2202*) *Mythimna l-album* (L.) L-album Wainscot: 2010.
73.301 (*2205*) *Leucania comma* (L.) Shoulder-striped Wainscot: 2011.
73.303 (*2206*) *Leucania putrescens* (Hübner) Devonshire Wainscot: 1986; 1987; Hemsley, Alexander & Hearn: 78; Table 3, '1990 N. Kemp (via AJP [A. J. Parsons])'; 1993 (MH).
73.307 (*2119*) *Peridroma saucia* (Hübner) Pearly Underwing: 2006; 2007.
73.312 (*2080*) *Euxoa obelisca* ([D. & S.]) Square-spot Dart: Longstaff; Palmer; 1973; 1986; 1989; 2011, given as '2080 Small Square-spot Dart Euxoa obelisca'.
73.313 (*2081*) *Euxoa triciti* (L.) White-line Dart: 1986; 1987; 1995.
73.317 (*2089*) *Agrotis exclamationis* (L.) Heart & Dart: 1968; 1972; 1973; 1990; 1992; 1993 (MH); 2002; 2009–2012.
73.319 (*2087*) *Agrotis segetum* ([D. & S.]) Turnip Moth: Chanter; Parfitt; Longstaff; Palmer; 1968; 1990; 1992; 2000 & 2001; 2006–2009; 2011.
73.324 (*2090*) *Agrotis trux* (Hübner) Crescent Dart: Longstaff; Palmer; 1968; 1973; 1986-1990; 1993 (MH); 1995; 2002; 2007–2012.
73.325 (*2092*) *Agrotis puta* (Hübner) Shuttle-shaped Dart: 1990.
73.327 (*2091*) *Agrotis ipsilon* (Hufnagel) Dark Sword-grass: Longstaff; Palmer; 1968; 1986; 1987; 1989; 1990; 1995; 1996; 1999; 2006–2012.
73.328 (*2098*) *Axylia putris* (L.) Flame: 1968; 1973; 1992. (Parfitt gives 'The Clouded-bordered Brindle Axylia putris'; it is unclear whether he was referring to this species or 73.156 *Apamea crenata* Clouded-bordered Brindle.)

73.329 (*2102*) *Ochropleura plecta* (L.) Flame Shoulder: 1968; 1973; 1988; 1990; 1995; 2009–2012.
73.333 (*2120*) *Diarsia mendica* (F.) Ingrailed Clay: 1968; 1973; 1989; 2009; 2010.
73.334 (*2123*) *Diarsia rubi* (Vieweg) Small Square-spot: 1982; 1988; 1990; 1992; 2009–2011.
73.338 (*2118*) *Lycophotia porphyrea* ([D.&S.]) True Lover's Knot: Longstaff; Palmer; 1973; 1987; 1993 (MH); 1995; 2009–2012.
[73.339 (*2105*) *Rhyacia simulans* (Hufnagel) Dotted Rustic: Hemsley, Alexander & Hearn: Table 3, '1987 D. Wedd (p.c.)'. David Wedd has told us (*in litt.*) that he is sure that he never recorded this species, but did note several 73.341 *Standfussiana lucernea* Northern Rustic. There are only three other Devon records, two from VC3 and one from VC4, none of which can be confirmed by voucher material.]
73.341 (*2104*) *Standfussiana lucernea* (L.) Northern Rustic: 1968; 1973; 1986; 1987; 1993 (MH); 2012.
73.342 (*2107*) *Noctua pronuba* (L.) Large Yellow Underwing: Chanter; Parfitt; Longstaff; Palmer; 1951; 1968; 1972; 1973; 1986–1990; 1993 (MH); 1995; 1996; 1999; 2002; 2004; 2006–2012.
73.345 (*2109*) *Noctua comes* Hübner Lesser Yellow Underwing: Parfitt, (given by him as 'Lesser Yellow Underwing Triphea orbona'); 1968; 1973; 1984; 1986–1990; 1993 (MH); 1995; 2000 & 2001; 2002; 2006; 2009; 2011. The form *sagittifer* (Cockayne) having very prominent, dentate, cross-lines, occurs on Lundy as well as on the Isles of Scilly and the Hebrides.
73.346 (*2112*) *Noctua interjecta* Hübner Least Yellow Underwing: 1986.
73.348 (*2111*) *Noctua janthe* (Borkhausen) Lesser Broad-bordered Yellow Underwing: 1993 (MH): 1995.
73.357 (*2134*) *Xestia xanthographa* ([D. & S.]) Square-spot Rustic: Longstaff; Palmer; 1986–1988; 1990; 1992 (as *Euxoa obelisca*); 1993 (as *Euxoa obelisca*); 1993 (MH); 1999; 2007–2009; 2011.
73.359 (*2126*) *Xestia c-nigrum* (L.) Setaceous Hebrew Character: 1951; 1992; 2000 & 2001; 2007–2011.
73.365 (*2117*) *Eugnorisma glareosa* (Esper) Autumnal Rustic: 2008; 2011.

NOLIDAE
74.003 (*2077*) *Nola cucullatella* (L.) Short-cloaked Moth: 2012.
74.004 (*2078*) *Nola confusalis* (Herrich-Schäffer) Least Black Arches: 2011.

Acknowledgements

We are very grateful to Roy McCormick and Barry Henwood, former and current County Moth Recorders for Devon respectively, for making available to us information held on the Devon Moth Group database, and to the latter for reading the manuscript and his helpful suggestions. We are particularly grateful to David Wedd for commenting on various records. We thank Martin Luff for advice on the nomenclature of the beetles on the Lundy Cabbage and the National Trust for allowing us to refer to their unpublished Survey of Lundy.

References

Agassiz, D. J. L., Beavan, S. D. & Heckford, R. J. 2013. *A checklist of the Lepidoptera of the British Isles*. Handbooks for the Identification of British Insects. Published for the Royal Entomological Society by the Field Studies Council. Telford.

Bradley, J. D. 2000. *Checklist of Lepidoptera recorded from the British Isles* [Privately published.]

Bristowe, W. S. 1931. A small collection of insects from Lundy Island. *The Entomologist's Monthly Magazine* **67**: 232.

Carpenter, G. D. H. 1943. New records of insects and woodlice from Lundy island. *The Entomologist's Monthly Magazine* **79**: 121–23.

Chanter, J. R. 1877. *Lundy Island: a Monograph, Descriptive and Historical; with Notices of its Distinguishing Features in Natural History*. Cassell, Petter, and Galpin. London.

Cox, M. L. 2007. *Atlas of the Seed and Leaf Beetles of Britain and Ireland*. Pisces Publications. Newbury.

Dannreuther, T. 1948. Migration records, 1947. *The Entomologist* **81**: 73–83.

Davis, A. M. 2012. *A Review of the Status of Microlepidoptera in Britain*. Butterfly Conservation. Wareham. (Butterfly Conservation Report no. S12–02).

Heckford, R. J. & Sterling, P. H. 2000. *Eudonia murana* (Curtis, 1827) and *E. truncicolella* (Stainton, 1849) (Lepidoptera: Pyralidae) a guide to separation on female genitalia and a note on distribution. *Entomologist's Gazette* **51**: 13–21.

Hemsley, J., Alexander, K. & Hearn, K. 1992. *Biological Survey. Lundy, Devon. 1986 Survey*. Unpublished report to National Trust.

Ivimey-Cook, R. B. 1984. *Atlas of the Devon Flora*. The Devonshire Association for the Advancement of Science, Literature and Art. Exeter.

Karsholt, O. & Nielsen, P. S. 2013. *Revideret fortegnelse over Danmarks Sommerfugle*. Lepidopterologisk Forening. København.

Key, R. S. 1995. *Nothris congressariella* (Braund, 1858) (Lepidoptera: Gelechiidae) reared from Lundy. *The Entomologist's Record & Journal of Variation* **107**: 273–275.

Longstaff, G. B. 1907. First notes on the Lepidoptera of Lundy Island. *The Entomologist's Monthly Magazine* **43**: 241–244.

Martineau, A. H. 1894. Exhibition of Lepidoptera collected on Lundy Isle by R. W. Chase, Birmingham Entomological Society. *The Entomologist* **27**: 203.

McCormick, R. 2001. *The Moths of Devon* [Privately published.]

Palmer, M. G. 1946. Butterflies and moths, pp. 67–112. *In* Palmer, M. G. (Ed.) *The Fauna and Flora of the Ilfracombe district of north Devon*. James Townsend & Sons, Ltd. Exeter.

Parfitt, E. 1878. The Fauna of Devon. Lepidoptera. *Transactions of the Devonshire Association* **10**: 411–588. [The Lundy records are at pp. 586–588]

Smith, K. G. V. 1958. Some records of Diptera and other insects from Lundy. *The Entomologist's Monthly Magazine* **94**: 94.

Walker, F. A. 1890. List of insects observed on Lundy Island, July 13th, 1888. *The Entomologist* **23**: 140.

Wollaston, T. V. 1845. Note on the entomology of Lundy Island. *The Zoologist* **3**: 897–900.

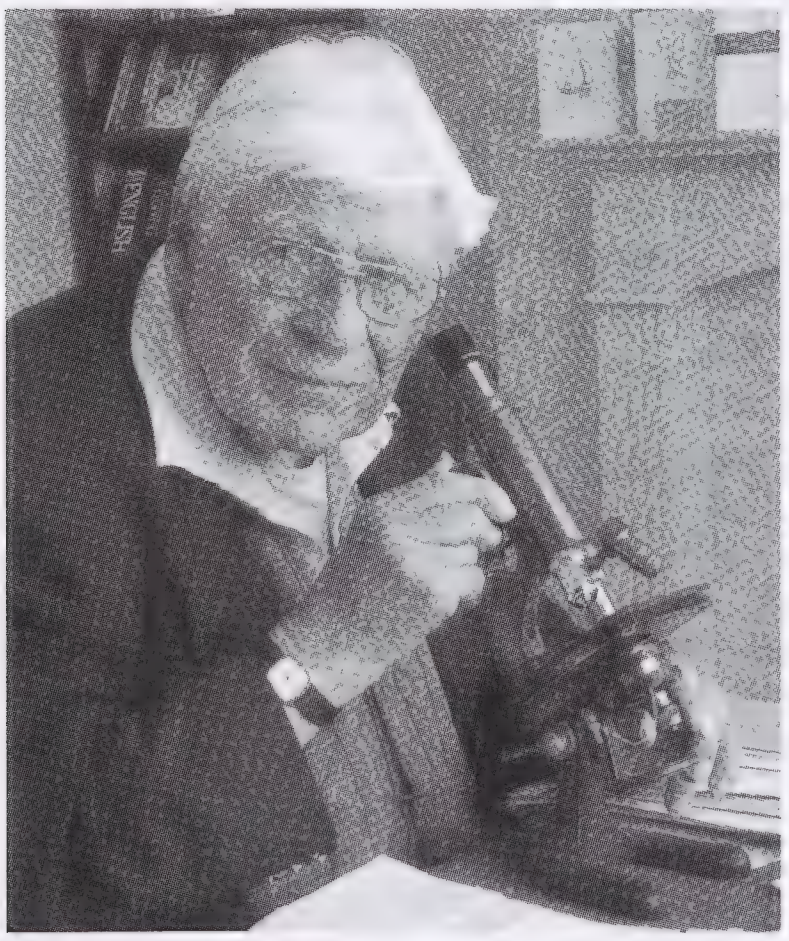
OBITUARIES

Robert Stephen George
1921–2013

Few people are gifted enough to have either an amazing career or a lifelong passion, but Bob George was one of those extraordinary people who had both. Born on 5th May 1921 in Gloucester to an architect father, the young Robert Stephen George showed early promise as a budding biologist with his interest in collecting all things natural – mosses, spiders, birds' eggs, butterflies, fossils, newts etc. As a sixth former he recorded over 500 species of flowering plants, data which were later used in the publication *Flora of Gloucestershire* (1948). On leaving school, war broke out, and in March 1941 he joined the RAF, training as a pilot in the USA. On his return to the UK, he took to flying Spitfires, and was based with the No. 616 South Yorkshire Squadron, attacking road and rail communications in Northern France. In 1944 he converted to the Meteor, and moved to Kent to intercept V1 flying bombs. Towards the end of the war he was carrying out ground attack missions in Germany and, as an experienced fighter pilot, he started instructing new pilots, before leaving the RAF in 1946.

In 1943 Bob had married Dorothy Benoist and, perhaps favouring a quieter life after the war, he decided to pursue a career in education, teaching biology at his former school and later becoming Principal of Adult Education at a college in Cambridgeshire. By 1949 he was already rekindling his fascination with natural history, but was inclined towards beetles. However, this all changed when he lived in a flat inconveniently located on a "mouse-motorway" between a restaurant and a butcher's shop. Over three nights, and with threes traps, he caught 35 mice, one of which had 15 fleas on it. He sent the fleas to Frans Smit, curator of the Rothschild collection of Fleas at Tring Museum who identified them for him, and told him that two species were new to Gloucestershire. A few days later Bob collected a few hundred fleas from the nest of a long-tailed tit located in a coal heap in the playground where he taught, and this haul led to another two new species recordings. So within the space of a few days, Bob's collecting had resulted in four new flea species records for Gloucestershire! Encouraged by Smit and Miriam Rothschild, another expert on fleas, Bob was hooked, realising that by studying fleas he could make a real difference to the recording of the British fauna, whereas the showy beetles were already heavily oversubscribed with enthusiastic amateurs. His first paper on fleas was *The Siphonaptera of Gloucestershire* and he went on to publish over 50 papers on fleas, including the first *Provisional Atlas of the Distribution of British Fleas* in 1974 with the Biological Records Centre at Monks Wood. By 2006 he had identified and recorded several hundreds of thousands of specimens, and a second *Atlas of the Fleas (Siphonaptera) of Britain and Ireland* was published in 2008, which he felt reflected

much better the distribution of fleas, rather than the distribution of collectors of fleas. The second *Atlas* also coincided with the second *Handbook of British Fleas* published in 2007 by the Royal Entomological Society and the Field Studies Council, the first Handbook having been published by Smit in 1957. As the author of this Handbook, this is where my connection with Bob began. As soon as he heard of my appointment through Flea News, he immediately wrote to me, expressing his delight that Smit's original handbook was to be updated. Thereafter, we regularly communicated, and I received many letters written in neat black handwriting on pink paper (complete with the headline "Recording Britain's Fleas" and a line drawing of a female cat flea). Bob was immensely helpful in reading and commenting on the draft manuscript, and in pointing me to references I may have omitted. He also allowed me to use a wonderful poem written and given to him by Smit in 1985. I reciprocated by sending him copies of publications which he did not have, and supplying the front cover photograph for his updated *Atlas*.



Although something of a local celebrity in Bournemouth, and regularly featured in the local papers, his wife didn't always share his passion. She was horrified one day when she overheard some people passing the house, one of them commenting "that's the house which contains thousands of fleas"! They were indeed correct, and Bob's initial 15 fleas found on a single mouse pales in comparison to the 5080 fleas found in a single house martin's nest. This figure was then trumped by the 7,116 fleas collected from a single hedgehog sent by a hedgehog sanctuary in Guernsey – for the next year or so they sent him the fleas from every hedgehog they received, 30 vials at a time. Of the 1000s received, all but ten were identified by him as the hedgehog flea. He also debunked the generally-held belief that all hedgehogs are loaded with fleas – apparently 25% of the animals had 100-800 fleas, 5% had 50–100, 30% had 1–50, and 30% had no fleas at all. Over the years as the UK Flea Recorder, Bob had an army of collectors working around the country, mainly bird and bat enthusiasts, who would regularly send him fleas, often alive and still attached to parts of their host or host's nest, much to the disapproval of the Post Office. His wife and children weren't too pleased either when, during a week that he was away from home, the inhabitants of a badly packed bird's nest escaped.

Fleas are a much understudied order of insect, but most British entomologists will no doubt have had a connection with Bob through Marris House Nets, the company he established in the 1970s specialising in the manufacture and supply of entomological nets. Through a local contact in Bournemouth, Bob had become interested in mymarids, a family of chalcid wasps, commonly called 'fairyflies' or 'fairy wasps'. On visiting the Natural History Museum's wasp experts in order to learn the best way of collecting these tiny flying insects, he was shown a Malaise trap, and told that they had to be hand-made in-house and then dyed black. Bob was convinced that he could do better, and within a week had found a supplier of the necessary black material, together with someone to make them. However, it was only

possible to buy the material in bulk, so he was persuaded to commit himself to making and selling a large quantity of nets. Thus Marris House Nets was conceived, and Malaise traps are still the most commonly used trap for sampling airborne insects. He even used mymarids as the inspiration for his company's logo – the image of a naked female fairy with flowing locks and four wings against a hatched triangle will be very familiar to most UK entomologists!

Bob was a Fellow of the Linnean Society, a Fellow of the Royal Entomological Society, and a founding member of the Gloucester Wildlife Trust. He was awarded Honorary Membership of the National Biodiversity Network Trust in 2006.

Bob's wife Dorothy died in May 2005, and he is survived by a son and two daughters, plus three grandchildren.

AMORET WHITAKER

BARRY HARPER
1942–2013

A long standing member of the British Entomological & Natural History Society (BENHS) and the Bristol Naturalists' Society (BNS), Barry Harper died in his home city of Bristol in 2013.

A rather private man, Barry was an only child, raised in the south of Bristol. He never married nor owned a car and perhaps consequently, had an encyclopaedic knowledge of public transport timetables. He was of an enquiring mind and soon developed an interest in wildlife, especially in butterflies, bringing home larvae and pupae in order to see what emerged. Moths did not interest him. He loved walking and soon exhausted his nearby slopes such as Dundry Hill on the southern edge of Bristol and so travelled further afield to places such as Cheddar often walking much of the way home across country, a very considerable distance. In his younger days he was able to visit nearby localities for such species as the Marsh Fritillary, now sadly built over.

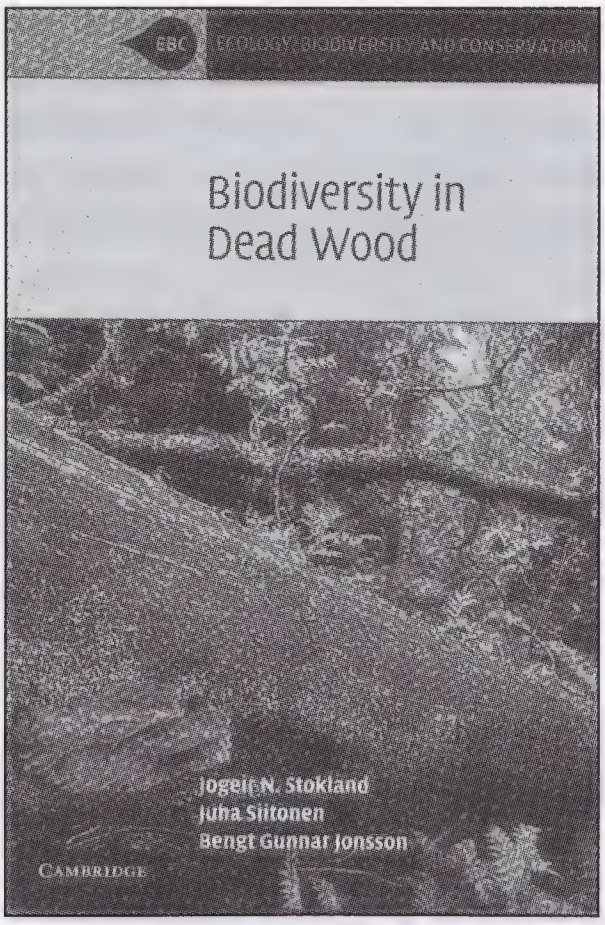
After leaving school, Barry started work at Colthurst and Harding paint wholesalers but soon, wishing to explore wider horizons, joined the RAF for 10 years as a clerical worker where his Lepidoptera watching interests were soon expanded when stationed around the world, including North Africa. He returned home to live with his parents and encouraged them, via package tour travel, to visit several destinations in Europe and especially to his favourite Switzerland and Austria sometimes bringing home seeds of plants and livestock of Lepidoptera to rear. His particular favourites were the Blues and Clouded Yellow species, rearing many in captivity. His career after leaving the RAF was initially with Bristol City Council before becoming a rent collector which allowed him more opportunity to be outdoors.

A member of the Amateur Entomologists Society he often travelled by train to the society's Annual Exhibitions in London, particularly to purchase butterfly livestock. In the 1970s and 1980s he was active in the Entomology Section of the Bristol Naturalists' Society and visits to the AES Exhibition were facilitated by the Section hiring a minibus, the scene of much enjoyable Lepidoptera talk and banter on the way. Latterly he travelled with Graham Best and others by car often meeting former members there.

As a member of the BNS, Barry contributed butterfly records to the annual insect reports from 1972 to 1985 and himself wrote the Butterfly Report in the BNS Proceedings in 1978–1980. He also exhibited at the annual Entomology Section Members' Day held at Bristol City Museum & Art Gallery at that time.

His long interest in butterflies never left him and is reflected in the very generous legacy left to both the British Entomological and Natural History Society and the Bristol Naturalists' Society.

GRAHAM BEST and RAY BARNETT



BOOK REVIEW

Biodiversity in Dead Wood by Jogeir N. Stokland, Juha Siitonen & Bengt Gunnar Jonsson. Cambridge University Press, 2012. 509pp. Hardback, £75.00, ISBN 978-0-521-88873-8 or Softback, £38.00, ISBN 978-0-521-71703-8.

To my knowledge this is the first ever whole book to attempt an introductory synthesis of all that is known about the wildlife associated with decaying wood. The title uses 'Dead Wood' as this is snappier and in more general usage than 'wood-decay' or 'decaying wood', but effectively this is a book about the process of wood decay and the rich variety of organisms which are either involved in the process or at least benefit from it. The book is appropriately dedicated to Bengt Ehnström, author of the inspirational *Life After Death – an insect drama* (1998, Media Express, Stockholm) which described 40 years of colonisation and abandonment by insects of two particular spruce stumps in a Swedish forest. These two books form the opposite extremes of approach, from very localised detail to global overview, although the coverage has necessarily been less than global of course – more later.

The book is split into 17 chapters, covering everything from the basic wood decomposition process itself, food webs and microhabitats, environmental factors, forest dynamics, sustainable management, threatened species and conservation management. Each chapter comprises around 20–30 pages which provides some idea of the scope and depth of content; 82 pages of references also demonstrates the depth of background research carried out, i.e. one page in six is a list of the source material! The chapter on evolution of saproxylic organisms was a particular eye-opener, covering the evolution of woody plants and the origins of wood decomposers. But I discovered that I was also finding things previously unfamiliar to me in every chapter.

A great strength is the combination of mycology and entomology as so many authors tend to show their specialism as much by getting things very wrong when outside their comfort zone as providing useful information when inside. A good example is provided by the very rare longhorn beetle *Anoplodera sexguttata* (F.) which is notably poorly understood in Britain. I had been told that it develops in red-rotten oak wood lying in shady humid situations and so I had naturally assumed that the host fungus was either Chicken-of-the-Woods *Laetiporus sulphureus* or Beefsteak *Fistulina hepatica*. This new book provides more detail: it seems to develop specifically in oak sapwood decayed by the fungus *Hymenochaete rubiginosa*. This was apparently identified by Bengt Ehnström and a colleague but published in a book written in Swedish about insect galleries in wood and bark in 2002. *Hymenochaete rubiginosa* is very widespread in Britain and favours well-seasoned oak wood – the wood needs to have been left in situ for a long period before it is colonised by the fungus – and before the beetle can be attracted. So we can now say something constructive about conservation management for this rare and threatened beetle. Another useful snippet is that the longhorns *Molorchus minor* (L.) and *Obrium brunneum* (F.) favour suppressed small trees in overcrowded stands, emphasising the point that tree girth and stress factors may be more important than tree species.

The three authors are based in three different Scandinavian countries; the first has more of a mycological background, the second is mainly a beetle specialist and the third a plant ecologist. One enormous benefit of this collaboration has been making information published in other European languages accessible to English-speaking people. They work in various institutes and universities and this is reflected in a somewhat academic style. They also have forestry backgrounds and this is noticeable in some of their attitudes – a little too much 'attack' and 'invade' when they are discussing feeding and colonisation. They have tried to present a global perspective but they are naturally strongest on boreal conifer forests – they admit as much in the Preface. A particular case where the forestry and conifer focus is a serious shortcoming is with Chapter 8 (Tree Size), which is notably thin on content and not very useful for someone interested in broad-leaved trees, where girth is a major feature of importance.

Notable omissions include any discussion of how trees generate dead wood, the ageing process, and the distinction between heartwood and ripewood – things more important in temperate broad-leaved trees than in boreal conifer forest. The section on competition does not cover the issue of secondary development around veteran trees which is a big issue in temperate broad-leaved areas but apparently not in conifer forests. The five stage death and decay succession presented is all very well but it assumes that the trees are dying; it does not cover the more typical situation in broad-leaved areas of decay developing as healthy trees age. It was good however to see people from a forestry background stating that "most heart-rot fungi are unable to invade functionally intact sapwood, which restricts their growth to the central core of the tree"; the forestry sector has historically been one of the worst for regarding all fungi as undesirable.

The most disappointing aspects from a personal point of view is the narrow focus on forests; this is not made clear in the book title. I do not recall this being expressly stated anywhere, neither do I recall finding a definition of what the authors mean by the term 'forest' in terms of structure and dynamics. Cultural landscapes, the places where we all live, are relegated to Chapter 16, 'Dead Wood in agricultural and urban habitats' almost as an afterthought, which effectively polarises the book as more of a forestry text. In Britain – and much of Europe – this distinction between forest and cultural landscape is much less clear cut. Chapter 12, on 'Natural Forest Dynamics', does not cover the role of large herbivores, which are a major factor in the content and structure of habitats with trees across most of Europe. Instead there is a rather inadequate discussion of the closed high forest/open wood pasture debate in the agricultural chapter, which clearly shows the authors' biases.

This forestry bias is emphasised again in the 'Threatened saproxylic species' chapter (15) where the old story of forest clearance up to the Late Bronze Age is repeated uncritically. Strangely the authors do use an open-grown broad-leaved tree to describe the range of micro-habitats available in a living tree (fig. 7.1) – where were these in the closed ancient-forest? Frans Vera's magnificent book *Grazing Ecology and Forest History* relates primarily to the temperate lowlands of central and western Europe, and so this shortcoming appears to arise primarily out of the boreal conifer forest slant of this new book.

Chapter 13 on 'Sustainable Forest Management' is almost entirely focused on commercial conifer forestry. The section on forest reserves (13.6) does not mention grazing, either by wild or domesticated herbivores.

Chapter 16 is very amusing to read, with the forestry-thinking authors sounding surprised to find the real world – outside of 'forests' – so rich in rare saproxylics; is there a clue that they have been missing?! It seems that 'species adapted to naturally open, grazed or otherwise disturbed woodland can readily inhabit cultural

woodland' – so where were these species before the closed forests were opened-up? Closed forest thinking is a strange self-blinding condition! Hopefully they will have a 'light bulb moment' in due course.

But I am pleased to find their conclusion: "From the point of view of conservation and proper management of the remaining valuable woodland areas, the question about which of the two vegetation types, closed forest or open woodland, was the dominating one during the early Holocene in western Europe seems to be rather irrelevant. Management targets in each individual case should be based primarily on the present structural features, occurrence of vulnerable species and their specific habitat requirements, and on the foreseen successional development with or without management interventions." So they appear to agree that 'minimum intervention' management is not appropriate in modern cultural landscapes.

It is, therefore, both an exciting and disappointing book. Exciting as it is the first ever book to my knowledge to attempt to cover all aspects of biodiversity in dead wood. It contains much that is new to me and in some cases in topics I had not previously considered. Disappointing due to the limitations of the Scandinavian conifer basis, which raises questions about its relevance to the temperate broad-leaf systems of much of the UK and western Europe – even of limited relevance to the Caledonian pine forest situation, due to lack of recognition of large herbivore relationships with biodiversity. It is good to have the statements that saproxylic species are one of the most threatened organism groups and that there is today a greatly reduced abundance of large over-mature trees and large-diameter dead wood. We all know this but now we have a very modern and authoritative book to cite as evidence. The subject matter is however enormous and one book written by Scandinavian conifer forest researchers will inevitably be thin on broadleaves. Basically this book will be most useful to people interested in conifer forests, but it does contain much useful material relevant to broad-leaved trees. What is needed now is a book written with more of a focus on the broad-leaved trees of temperate Europe.

KEITH ALEXANDER

FIELD MEETINGS

Summary of Field Meetings of Northants and Peterborough Diptera Group in 2012

Leader: **John Showers**. – Again in 2012, we had a weekly field meeting from the end of April to the end of August. Despite the generally poor weather we did manage to find some interesting species of Diptera. Numbers attending meetings ranged from one to seven. The following is a summary of our findings.

Our first meeting at **Kelmarsh** Estate at the end of April was a complete washout with torrential rain all day. May continued cool and wet. At **Farthinghoe Nature Reserve** on 6th May the stiletto fly *Thereva plebeja* (L.) was the highlight of a list of common species. On 13th at **Barnes Meadow Nature Reserve,** a small wetland in Northampton, the hoverflies *Anasimyia contracta* Claussen & Torp, *A. lineata* (F.), *Helophilus hybridus* Loew and *Neoascia meticulosa* (Scopoli.) were all found around the linear ditches and banks of the River Nene backwater. The following weekend, again in Northampton, a visit to the dry grassland of **Bradlaugh Fields Nature Reserve** was very disappointing, with poor weather conditions. Only seven species of common hoverfly were recorded. On 27th May a visit to **Stoke Wood Nature Reserve** was attended by only one person but it did turn up *Brachyopa scutellaris* Robineau-Desvoidy, *Melangyna labiatarum* (Verrall) and *Rhingia rostrata* (L.). This latter species has expanded its range into Northamptonshire over the past few years

and is now found in most ancient woodland sites. The ulidiid, *Otites guttatus* (Meigen) was widespread in the wood.

June was disappointing too. The meeting on 3rd was cancelled. On 10th only one person managed to visit **Summer Leys Nature Reserve,** a large wetland created from flooded gravel pits alongside the River Nene. The hoverflies *Chrysotoxum cautum* (Harris), *Epistrophe diaphana* (Zetterstedt) and *Pipizella virens* (F.) were recorded. On 17th we moved further upstream on the R. Nene to **Abington Meadows Nature Reserve** in Northampton. This seasonally flooded grassland proved very productive with 26 species of hoverflies recorded, including *Anasimyia lineata* (F.), *Parhelophilus versicolor* (F.) and *Eristalinus sepulchralis* (L.). We have very few records of Sphaeroceridae, Muscidae and Tachinidae in the county so *Copromyza equina* Fallén, *Helina depuncta* (Fallén), *H. setiventris* Ringdahl and *Oswaldia muscaria* (Fallén) were interesting. Our last meeting of June (24th) was again in the Nene Valley at **Irthlingborough Lakes and Meadows Nature Reserve.** This large area has recently been taken on by the Wildlife Trust for Bedfordshire, Cambridge and Northamptonshire and surveys of its wildlife will be used to help plan its development. Eighteen species of hoverfly were recorded including *Anasimyia contracta*, *Epistrophe diaphana* and *Pipizella viduata* (L.).

On 1st July, we visited **Denton Wood,** a private ancient woodland in the south of the county. Hoverflies included *Syrphus torvus* Osten Sacken and *Volucella inflata* (F.). A small pond with boggy margins produced the sciomyzids *Euthycera fumigata* (Scopoli), *Ilione albiseta* (Scopoli) and *Pherbellia dorsata* (Zetterstedt). On 8th **High Wood and Meadows Nature Reserve** in the south-west of the county was our destination. This very attractive reserve is one of our favourite sites. The windy conditions did not help in finding flies but we did record *Chrysotoxum verralli* Collin, *Epistrophe grossulariae* (Meigen), *Eristalis horticola* (De Geer). Amongst the larger Brachycera, the robberfly *Leptarthrus brevirostris* (Meigen); the soldierflies *Stratiomys potamida* Meigen, *Beris fuscipes* Meigen and *Beris vallata* (Forster) and the horsefly *Hybomitra distinguenda* (Verrall) were also recorded. On 15th we visited **Twywell Hills and Dales Nature Reserve**, an old limestone quarry with extensive grassland, scrub and a few ponds. The highlight was the soldierfly *Oplodontha viridula* (F.), swept from a shrub next to a pond. Woolly thistle *Cirsium eriophorum* held many of the tephritid fly *Terellia longicauda* (Meigen). Other tephritids, *Urophora jaceana* (Hering) and *U. quadrifasciata* (Meigen) were also present. Amongst the hoverflies, *Chrysotoxum festivum* (L.) and *Xanthogramma pedissequum* (Harris) were the more colourful specimens. On 22nd July the meeting was held at **Greens Norton** where we visited a private wildlife garden and the village's pocket park. The hoverflies *Orthonerva brevicornis* (Loew), *Helophilus hybridus* Loew and *Scaeva pyrastri* (L.); the larger Brachycera *Dioctria rufipes* (De Geer) (Asilidae) and *Tabanus bromius* (L.) (Tabanidae) and the tachinid *Eriothrix rufomaculata* (De Geer) were noted. Our final visit in July was to **Pitsford Water Nature Reserve,** a large reservoir with its surrounding land managed for wildlife by the local Wildlife Trust. The most notable hoverflies were *Chrysotoxum verralli* Collin and *Volucella inanis* (L.). Other interesting records were the tachinid *Phasia obesa* (F.), a new record for the site, and the dolichopodids *Chrysotus neglectus* (Wiedemann) and *Dolichopus wahlbergi* Zetterstedt.

On August 5th we visited the ancient woodland of **Southwick Wood Nature Reserve,** where our activities were curtailed by a tremendous downpour. However we did note *Volucella inanis* (L.) and *Conops flavipes* (L.). On 12th we were back in the Nene Valley at **Ditchford Nature Reserve**, another flooded gravel pit alongside the river. Several dolichopodids were noted: *Dolichopus festivus* Haliday, *D. plumipes* (Scopoli), *D. trivialis* Haliday and *Rhapium caliginosum* Meigen. The following week

Stoke Bruerne Brickpits Reserve in the South of the county was our destination. This turned up a few interesting hoverflies: *Eristalinus sepulchralis* (L.), *Helophilus trivittatus* (F.), *Orthonerva nobilis* (Fallén) and *Chrysogaster cemiteriorum* (L.). There seemed to be an influx of *H. trivittatus* around this time as it started turning up at many sites, whereas we normally only get a few records each year. Our final visit was to **Boddington Meadows Nature Reserve** in the South-west of the county. Generally, the West of Northamptonshire is far less well recorded than the East and central areas so most visits provide new records at the tetrad level. Again *Helophilus trivittatus* (F.) was plentiful, especially on the field scabious *Knautia arvensis* flowers and *Parhelophilus versicolor* (F.) was also noted. Several specimens of the robberfly *Machimus atricapillus* (Fallén) were also present.

Sandwich Bay Coleopterists' Meeting, East Kent, 31 August–2 September 2012

Organiser: **Mark G. Telfer**. – Fourteen coleopterists (Fig. 1) assembled at Sandwich Bay Bird Observatory for this Coleopterists' Meeting. The weather stayed dry and mostly sunny for us throughout, which is not how most of the summer of 2012 will be remembered. The meeting did not formally start until Saturday morning (1st September) but most people travelled down on the Friday and had already begun fieldwork by the time we gathered at an Indian restaurant in Sandwich village on Friday evening. After dinner, a small party donned head-torches and headed out with sweep-nets to the dunes north of the Prince's Golf Course clubhouse. This excursion yielded the phalacrid beetle *Olibrus norvegicus* Munster new to Britain (Telfer, 2013) though it was not until a few days later that I dissected my specimens and realised that I had found an extra species amongst the common *O. affinis* (Sturm). Of the species recognisable on the night, one of the most interesting finds was a single individual of the tenebrionid beetle *Xanthomus pallidus* (Curtis).

Fig. 1. Coleopterists attending the Sandwich Bay meeting. Left to right: Jo Hodgkins, Mark Telfer, Simon Horsnall, John Paul, Tony Allen, Kevin Chuter, Roger Booth, Grant Hazlehurst, James McGill, Peter McMullen, Julie Collier, Martin Collier, Graham Finch and the late Eric Philp.

After much loitering in the Bird Observatory car park on Saturday morning, the fieldwork got back underway with people dispersing in small groups, some south to Chequer's Inn, Deal, others to the dunes north of the Prince's Golf Course clubhouse, and some walking out to the north in search of dune tiger-beetle *Cicindela maritima* Latreille & Dejean. A major discovery was the dung-beetle *Euheptaulacus sus* (Herbst) which was found by Roger Booth (from a light trap), Tony Allen (by evening sweeping) and James McGill. It is many decades since this dung-beetle was recorded from Kent. It was a good day for carabids with several people finding *Amara curta* Dejean, and with several other scarce carabids being recorded: *Amara fulva* (O.F. Müller), *Amara equestris* (Duftschmid), *Harpalus serripes* (Quensel in Schönherr), *Dicheirotrichus obsoletus* (Dejean), *Panagaeus bipustulatus* (F.), *Masoreus wetterhallii* (Gyllenhal) and *Demetrias monostigma* Samouelle. We dined at a good Thai restaurant in the evening, followed by more torchlight fieldwork.

On the Sunday, while some carried on with fieldwork at Sandwich Bay, a few of us visited the other site for which permission had been arranged: Blean Woods RSPB Reserve. Martin Collier and I tackled a wood ants' nest – the first time either of us had attempted to find beetles in such a potentially painful microhabitat! We soon discovered that the ants were remarkably placid and the whole experience was surprisingly painless. There were very few beetles but our samples did include the rove-beetle *Gyrohypnus atratus* (Heer) and the histerid *Myrmetes paykulli* Kanaar, both ant-nest specialists. Meanwhile, Roger Booth and Tony Allen were beating dead and dying branches and amongst a good list of saproxylic beetles, found the Vulnerable anthribid beetle *Pseudeuparius sepicola* (F.) off a dead oak branch.

From records submitted to the organiser, we recorded 273 species of beetle (and 36 species of other invertebrates, including spiders, millipedes, dragonflies, bush-crickets, bugs, flies, bees, wasps, ants, moths and snails). Amongst the beetles were 7 Red Data Book, 1 Near Threatened and 36 Nationally Scarce species. In total, 16% of the beetles recorded during the meeting have conservation status, a figure which is consistent with top sites of national importance for invertebrate conservation. A species list and all the records from the meeting can be downloaded (http://markgtelfer.co.uk/2013/04/12/final-results-sbcm2012/).

Sandwich Bay Bird Observatory was a great base for the meeting and the Sandwich Bay area undoubtedly has many more discoveries awaiting the dogged coleopterist. I would like to thank Greg Hitchcock of the Kent Wildlife Trust for helping to arrange this meeting and Mark Gurney and Jason Mitchell of the RSPB for permission to visit the Blean Woods reserve.

Reference

Telfer, M. G. 2013. *Olibrus norvegicus* Munster, 1901 (Phalacridae) new for Britain. *The Coleopterist* **22**: 25–26.

Alver Valley, Rowner, Gosport, Hampshire, 4 August 2012

Leader: Stephen Miles. – The weather was dry for this meeting and fortunately a number of local experts from the Fareham Moth Group, namely Richard Dickson who has a long association with the site, Tony Tindale, Alastair Goodall and Keith Wheeler assembled at the Grange Farm meeting place. Also attending were Tony Dobson, Stewart Swift and a relative and a friend, and of course the leader, Stephen Miles. Four local naturalists attended, including two of the Council's site wardens to show us where we could place traps on the site and who came along to observe what appeared on the sheets and inside the traps.

It had already been decided by the leader that the Grange Farm garden would be a potentially good site in which to set light-traps because of its closeness to the Alver Valley fen system. The proximity of many old deciduous oak trees and some elms was an added bonus.

The leader's actinic light-trap was set back from the fen areas in amongst grassland and large bramble bushes and an area of apple trees at SU582002. Tony Tindale's MV light and sheet was placed in another grassed area, adjacent to a site containing sallows, oak trees and shrubs of various *Rosa* species at approximately SU582002. Alastair Goodall's MV light and sheet was situated on a raised platform immediately above the reeds of the fen and amongst oak and sallow trees at SU5826300187. Keith Wheeler's MV light and sheet was situated more to the southwest at SU583001 in a scrub and grassland area. Richard Dickson's MV light and sheet was situated approximately 150m NW of Alastair Goodalls' light and sheet, at SU582003. Finally Stewart Swift's light trap was situated in the garden area leading to the fen frontage where most of us were. The only exception was Tony Dobson who had his MV trap on the tarmac of the apex of Apple Dumpling Bridge with his small actinic trap immediately adjacent to the poor fen area of Alver Meadow at SU583000.

It is particularly interesting that this area has a historic set of moth records dating from the 1970's representing The Fareham Group of Entomologists, of which Richard Dickson was a participant. Fifteen new species of microlepidoptera and four macrolepidoptera species were added to the list for the site at this 2012 meeting.

The highlights of the species taken on the night were Tony Dobson's record of the Tree-lichen Beauty, *Cryphia algae* (F.), which at the time of the meeting was new to the SU5800 tetrad. However, according to the Hampshire Moths' website (www.hantsmoths.org.uk) small numbers of this immigrant and latterly resident breeder have been turning up on the Hampshire coast since 1991. The second species of note was the pyralid immigrant, *Udea fulvalis* (Hübner), which apparently has also recently established breeding populations on the Isle of Wight and on another part of the Hampshire coast. This record was confirmed by dissection by Richard Dickson. At Stephen Miles' actinic trap, Richard Dickson also kindly confirmed a specimen of the nationally notable species, Yarrow Pug, *Eupithecia millefoliata* Rossler. This is a species of waste ground and the trapping site exemplified this habitat.

Other equally interesting species included four specimens of the Double Lobed, *Apamea ophiogramma* (Esper), one each taken by Keith Wheeler, Alastair Goodall, Tony Tindale and Richard Dickson whose traps were situated adjacent to the wetland area of the main Alver Valley fen. Alastair Goodall's light, closest to the fen habitat, attracted the most wainscot numbers, with Brown-veined Wainscot *Archanara dissoluta* (Treitschke), Fen Wainscot *Arenostola phragmitidis* (Hübner), Silky Wainscot *Chilodes maritima* (Tauscher) and Southern Wainscot *Mythimna straminea* (Treitschke) all being represented, with some of these also present in other people's traps as well. This last named species was the most abundant with 17 plus recorded individuals, even Tony Dobson on the fringes of the main fen had five examples of this species.

One hundred and ten species of Lepidoptera were recorded from the five MV and two actinic lights from which records were received on the night. From this we can conclude that this area is still an important one for moths, despite all the changes that the fen and adjoining areas have experienced over the years. Thanks go to all those participants who brought their lights to this meeting. Thanks also to Fred Gibson and Pat Pattinson and the other staff of Gosport Borough Council for giving permission for the meeting to go ahead in the Alver Valley and for the welcome and introduction to the site given to all participants on the night.

THE MAITLAND EMMET BENHS RESEARCH FUND

In 2001 the family of the late Lt. Col. Maitland Emmet, a distinguished amateur microlepidopterist, made a generous donation to the Society's Research Fund in his memory. As a result the Society has renamed its Research Fund the Maitland Emmet BENHS Research Fund. The Society is very grateful to the Emmet family for their generosity.

The Society invites applications for grants, from the Maitland Emmet Research Fund, to be awarded in January 2015. Awards are open to both members and non-members of the BENHS and will be made to support research on non-marine arthropods, with reference to the British fauna, and with preference given to insects, arachnids, myriapods and isopods. Grants will be given for:

(a) the assistance of fieldwork on non-marine arthropods with relevance to their conservation,
(b) work leading to the production of identification guides and distribution lists, but not the cost of publishing such items.

Travel to examine museum collections and to consult taxonomic specialists would be included. The work and travel is not limited to the British Isles but must have a demonstrable relevance to the British arthropod fauna. Individual grants are unlikely to exceed £500.

Preference will be given to work with a clear final objective (e.g., leading to publication or the production of a habitat management plan). Work on leaf miners and gall forming insects should be submitted to the Society's Professor Hering Memorial Research Fund.

Applicants should send seven copies, if possible, of their plan of work, the precise objectives, the amount for which an award is requested and a brief statement outlining their experience in this area of work, to **Ms. B. Garner, Department of Life Sciences, Entomology, Natural History Museum, London SW7 5BD**, as soon as possible and not later than 31 December 2014. Further information may be obtained from the same address (email: b.garner@nhm.ac.uk).

THE PROFESSOR HERING MEMORIAL RESEARCH FUND

The British Entomological & Natural History Society announces that awards may be made from this Fund for the promotion of entomological research with particular emphasis on:

(a) leaf-miners
(b) Diptera, particularly Tephritidae and Agromyzidae
(c) Lepidoptera, particularly Microlepidoptera
(d) general entomology

in the above order of preference having regard to the suitability of applicants and the plan of work proposed.

Awards may be made to assist travelling and other expenses necessary for fieldwork, for the study of collections, for attendance at conferences, or, exceptionally, for the costs of publication of finished work. In total they are unlikely to exceed £1000 in the year 2015.

Applicants should preferably email, or send six copies, of a statement of their qualifications, of their plan of work, and of the precise objectives and amount for which an award is sought, to **Dr E. McAlister, Department of Life Sciences, Entomology, Natural History Museum, London SW7 5BD** (email: e.mcalister@nhm.ac.uk). The closing date for projects in 2015 is 31 December 2014.

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Cover photograph: Young larva of the Mullein moth *Shargacucullia verbasci* (L.), Boughton, Kent, 2014. Photo: Peter Maton.

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FIRST INCURSION OF GIANT BAMBOO SCALE *CHAETOCOCCUS BAMBUSAE* (HEMIPTERA: PSEUDOCOCCIDAE) IN BRITAIN

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ABSTRACT

The Asian Giant Bamboo Scale, *Chaetococcus bambusae* (Maskell) (Hemiptera: Pseudococcidae), is reported breeding on bamboo in Britain for the first time. It was first detected beneath the leaf sheaths of *Bambusa* spp. growing in the Humid Tropic Biome at The Eden Project, Cornwall, England, in 2005, and was still present in August 2013; its origin and pathway of introduction are unknown. It was attended by the White-footed Ant *Technomyrmex albipes* Smith (Hymenoptera: Formicidae), presumably feeding on the honeydew excreted by the mealybugs. The biology, geographical distribution, and economic importance of *C. bambusae* are reviewed.

INTRODUCTION

Some unusually large scale insects (Hemiptera: Coccoidea) were observed in 2005 by the second author feeding on *Bambusa* spp. (Poaceae) stems in the Humid Tropic Biome at The Eden Project, Cornwall, England. The scales were completely hidden beneath leaf sheaths and were only revealed once the leaves had been pulled away from the stems (Fig. 1). The scales were found on three species of bamboo, although the specific identity of the plants has not been confirmed as bamboo taxonomy is difficult and the plants are often misidentified and traded under the wrong name. The origin and pathway of introduction of the scales into The Eden Project is unknown. In March 2008 a sample of the scales was submitted to The Food and Environment Research Agency (FERA) laboratory at Sand Hutton for identification. Unfortunately, only mature, post-reproductive, heavily sclerotised adult female specimens were available for study and they were initially suspected to belong to the family Aclerdidae, or flat grass scales. The scale numbers in the Biome increased although they did not appear to harm the plants and they were attended by the White-footed Ant *Technomyrmex albipes* Smith (Hymenoptera: Formicidae) (Bolton, 2007), which fed upon the honeydew excreted by the insects. Further samples of scales were taken in March 2011 and August 2013 and submitted to FERA. The latter sample contained dozens of adults with varying degrees of maturity (Fig. 2), but also included teneral adult females. The scale was eventually determined to be *Chaetococcus bambusae* (Maskell) (Pseudococcidae), commonly known as Giant Bamboo Scale. Pseudococcids are more commonly known as mealybugs but the appearance of adult female *C. bambusae* is atypical as they are legless and more 'scale-like'.

The White-footed Ant is suspected to be native to Asia but it is an extremely successful tramp species and consequently become widespread in the tropics (Bolton, 2007). It has been present in the Humid Tropic Biome since at least 2004 (FERA unpublished records), and has become the dominant ant species having successfully formed mutualistic associations with several different sternorrhynchan pests (Treseder *et al.*, 2011), including *Aleurotrachelus atratus* Hempel (Aleyrodidae),

Coccus viridis (Green) (Coccidae), *Coccus hesperidum* L., *Nipaecoccus nipae* (Maskell) (Pseudococcidae), *Saissetia oleae* (Olivier) (Coccidae) and Aphididae.

The purpose of this communication is to report the first known incursion of *C. bambusae* in Britain (Williams & Malumphy, 2012); and to review its biology, distribution, and economic importance.

Chaetococcus bambusae (Maskell)

Synonymy: *Sphaerococcus bambusae* Maskell; *Chaetococcus bambusae* (Maskell); *Kermicus bambusae* (Maskell); *Antonina bambusae* (Maskell)

Detection and identification

Chaetococcus bambusae feed in groups on bamboo stems, and are usually completely hidden beneath the leaf sheaths. Adult female *C. bambusae* are elongate to broadly oval, with the posterior end gently rounded, becoming dark chestnut brown and heavily sclerotised with maturity (Fig 1). They exhibit significant variation in size, shape and colour, depending on maturity and feeding location (Fig. 2). Specimens feeding at the base of the leaf sheaths in cramped or crowded conditions are often smaller and their body shape distorted. The posterior abdominal segments are usually clearly defined, becoming narrower posteriorly in a stepped arrangement. Legs are absent and antennae reduced to stubs. They can attain a length of 10.0 mm and width of 5.0 mm, although a length of 6.0-7.0 mm long is more typical. Teneral females are membranous except for a sclerotised posterior margin, and are pinkish in colour. The adults develop a thin white felt-like cover but this is easily lost when the leaf sheaths are pulled apart to examine the mealybugs. They also bear a characteristic wax tube from the anus, through which honeydew is excreted (Figs 3-4).

Chaetococcus bambusae is not likely to be confused with any other scale insect found in Britain. However, accurate identification requires examination of a slide-mounted teneral adult female as the diagnostic characters cannot be observed in mature specimens. Morphological descriptions and illustrations of adult female *C. bambusae* and keys for the identification of *Chaetococcus* from different geographical regions are provided by Hendricks & Kosztarab (1999, key for *Chaetococcus* of the world), Williams (1958, Afrotropical region; 1985, Australia; 2004, Southern Asia), Williams & Watson (1988, tropical South Pacific), Williams & Granara de Willink (1992, Neotropical region), Williams & Matile-Ferrero (2009, Mauritius), and Wu (2001, China). Yang & Kostarab (1967) provide descriptions of the immature instars.

Host range

Chaetococcus bambusae is oligophagous on bamboo.

Poaceae: *Arundinaria* sp.; *Bambusa blumiana* Schult. & Schult.f.; *Bambusa chungii* McClure; *Bambusa dolichomerithalla* Hayata; *Bambusa multiplex* (Lour.) Raeusch. ex Schult. & Schult. f.; *Bambusa stenostachya* Hackel; *Bambusa textilis* McClure; *Bambusa vulgaris* Schrad. ex J. C. Wendl.; *Bambusa* sp.; *Dendrocalamus asper* (Schult. & Schult. f.) Backer ex K. Heyne; *Dendrocalamus brandisii* (Munro) Kurz; *Dendrocalamus giganteus* Wallich ex Munro; *Dendrocalamus hamiltonii* Nees et Arn. ex Munro; *Dendrocalamus latiflorus* Munro; *Dendrocalamus minor* (McClure) Chia & H.L. Fung; *Dendrocalamus strictus* (Roxb.) Nees; *Dendrocalamus* sp.; *Gigantochloa verticillata* (Willd.) Munro; *Gigantochloa* sp.; *Indosasa shibataeoides* McClure;

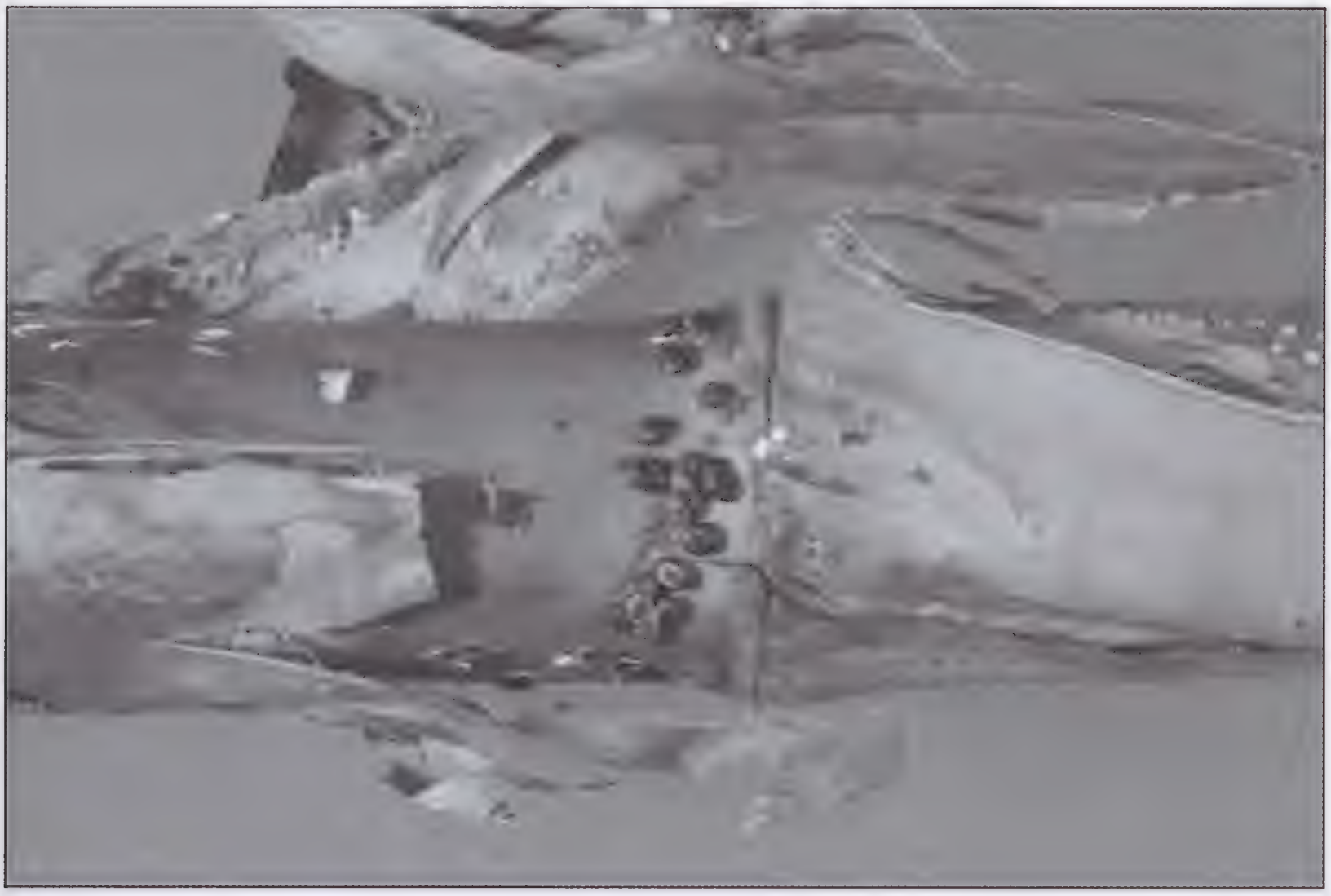

Fig. 1. Colony of *Chaetococcus bambusae* feeding on bamboo in the Humid Tropic Biome at The Eden Project, Cornwall, England. The mealybugs are usually hidden beneath the leaf sheaths.

Fig. 2. Adult female *Chaetococcus bambusae* showing variation in size, shape and colour depending on maturity and feeding location.

Fig. 3. Close up of two mature adult female *Chaetococcus bambusae,* showing the anal wax tubes through which honeydew is excreted.

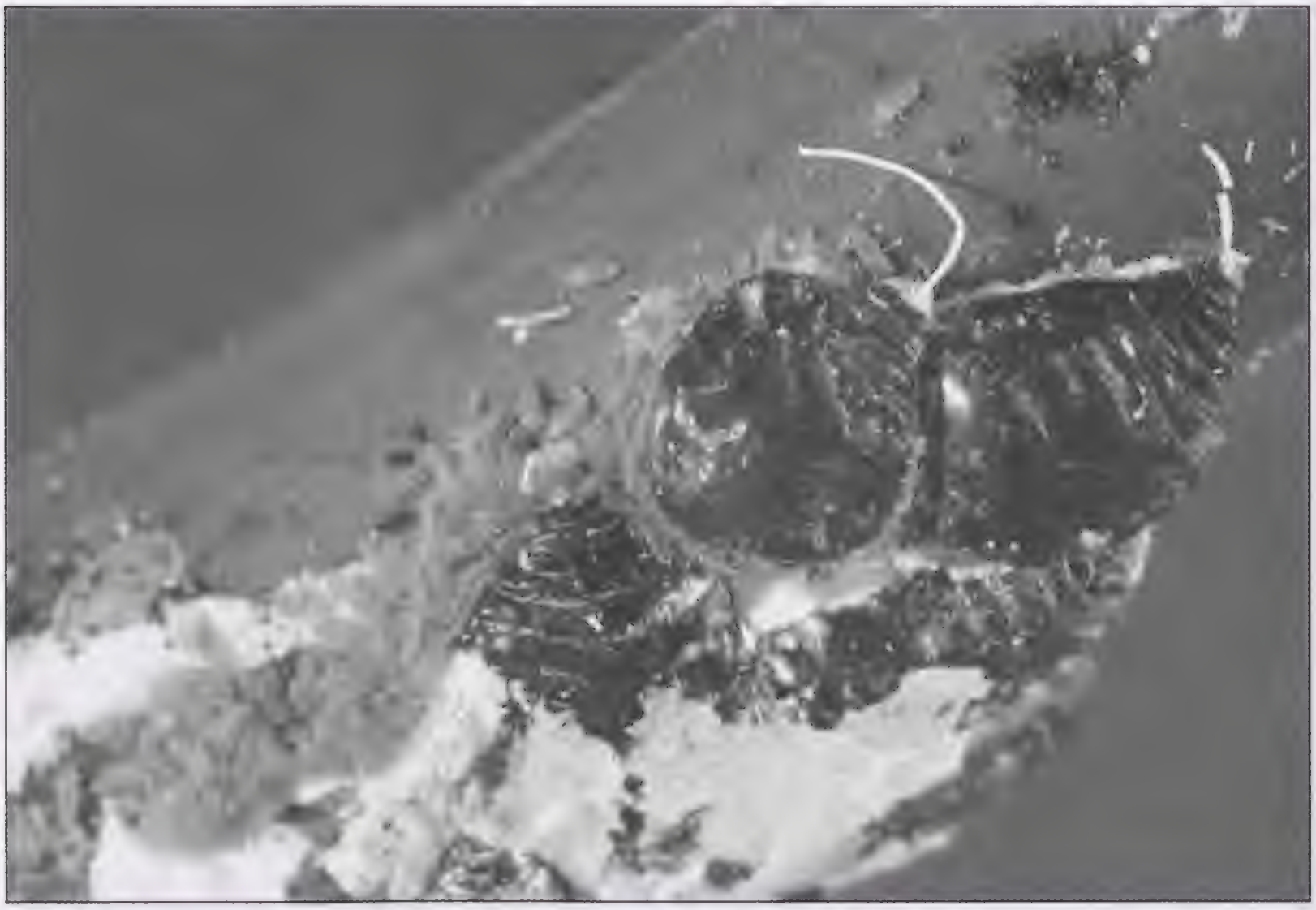

Fig. 4. Adult female and hundreds of bright pink first-instar *Chaetococcus bambusae* feeding on bamboo.

Miscanthus sp.; *Phyllostachys nigra* (Lodd. ex Lindl.) Munro; *Phyllostachys* sp.; *Schizostachyum* sp.; and *Sphaerobambos philippinensis* (Gamble) S.Dransf. (Ben-Dov, 2013, with nomenclature following Barlow, 2003).

The biology of *C. bambusae* is poorly known and no natural enemies have been recorded for this species. The mealybug populations at The Eden Project were attended by White-footed Ants which formed satellite nests over the mealybug infestations. Mature female mealybugs were only found beneath the old leaf sheaths of the main trunks (Fig. 1), but this may be because the plants were sprayed with pesticides during the winter which killed off the mealybugs feeding in more exposed situations such as on new growth and on thinner branches. The mealybugs appeared to have a low natural dispersal potential as they were only found on three individual clumps of bamboo at the Eden Project and have not spread to other bamboo clumps in the same biome.

Geographical distribution

Chaetococcus bambusae is likely to be native to Asia and has spread widely to all warmer regions of the world, including all the major continents, due to anthropogenic activities. It was recorded for the first time in Europe in Italy by Porcelli (1992), and from Turkey by Hendricks & Kosztarab (1999).

Afrotropical: Central African Republic; Mauritius; Mozambique; Rodriques Island; Senegal; South Africa; Tanzania; Uganda; Zimbabwe. **Australasian**: Australia; Bonin Islands; Federated States of Micronesia; French Polynesia; Hawaiian Islands; Northern Mariana Islands; Palau; Papua New Guinea. **Nearctic**: United States of America (Florida). **Neotropical**: Bermuda; Brazil; Guadeloupe; Jamaica; Panama; Puerto Rico & Vieques Island; Suriname; Trinidad and Tobago; U.S. Virgin Islands. **Oriental**: China; Hong Kong; India; Indonesia; Malaysia; Philippines; Sri Lanka; Taiwan; Thailand; Vietnam. **Palaearctic**: Azerbaijan; China; Georgia; Italy; Japan; Turkey; Ukraine (Ben-Dov, 2013).

Economic importance

Chaetococcus bambusae occurs widely in the tropics and in protected environments, such as public botanical collections, feeding on many species of ornamental and crop bamboo. However, there appear to be no published reports of it having any economic, environmental or social impact. This may simply be due, at least in part, to its cryptic nature meaning that it is often overlooked; and partly due to difficulties with identifying the species.

One bamboo plant infested with *C. bambusae* at The Eden Project died but this was likely to be due to a combination of causes such as root rot, over watering, bad pruning, as well as the mealybugs and an enormous population of bamboo pit scale *Bambusaspis bambusae* (Boisduval) (Hemiptera: Asterolecaniidae).

Conclusions

Chaetococcus bambusae is likely to be native to tropical Asia and has spread due to anthropogenic activities to become widespread throughout the tropics. It has also been found on indoor bamboo plantings in botanical collections in temperate regions. It has been breeding in the Humid Tropic Biome at The Eden Project continuously for several years (at least between 2005 and 2013) and is likely to persist for as long as suitable host plants are available. Although *C. bambusae* is likely to be

present at The Eden Project for the foreseeable future there is no obvious pathway from the botanical garden for it to be disseminated (infested plants will not be moved) and it is not likely to be able to survive, or at least overwinter, outdoors in Britain. It is therefore highly unlikely to have any economic, environmental or social impact in Britain.

Acknowledgements

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References

Barlow, S. 2003. Sorting the Names of Bamboos. The University of Melbourne. Accessed 5 December 2013. http://www.plantnames.unimelb.edu.au/Sorting/Bamboo_names.html

Ben-Dov, Y. 2013. *Chaetococcus bambusae* (Maskell). ScaleNet. Accessed 30 July 2013. http://www.sel.barc.usda.gov/catalogs/pseudoco/Chaetococcusbambusae.htm

Bolton, B. 2007. Taxonomy of the dolichoderine ant genus *Technomyrmex* Mayr (Hymenoptera: Formicidae) based on the worker caste. *Contributions of the American Entomological Institute* **35**: 1–150.

Hendricks, H. & Kosztarab, M. 1999. *Revision of the Tribe Serrolecaniini (Homoptera: Pseudococcidae)*. de Gruyter, Berlin & New York. xiv + 213 pp.

Porcelli, F. 1992 (1990). Cocciniglie nuove per l'Italia. *Frustula Entomologica* **13**: 31–38.

Treseder, K., Pytel, M., Mappley, M., Griffiths, A. & Pettitt, T. 2011. Evolution of pest management strategies in the rain-forest biome at the Eden Project, the first 10 years. *Outlooks on Pest Management* **22**: 22–31.

Williams, D. J. 1958. Mealybugs (Pseudococcidae: Homoptera) described by W.M. Maskell, R. Newstead, T.D.A. Cockerell and E.E. Green from the Ethiopian region. *Bulletin of the British Museum (Natural History) Entomology* **6**: 205–236.

Williams, D. J. 1985. *Australian mealybugs*. British Museum (Natural History), London. 431 pp.

Williams, D. J. 2004. *Mealybugs of Southern Asia*. The Natural History Museum, Kuala Lumpur: Southdene SDN. BHD. 896 pp.

Williams, D. J. & Granara de Willink, M. C. 1992. *Mealybugs of Central and South America*. CAB International, London, England. 635 pp.

Williams, D. J. & Malumphy, C. 2012. Mealybugs of Great Britain: A revised and updated checklist (Hemiptera: Coccoidea: Pseudococcidae). *Entomologist's Monthly Magazine* **148**: 81–94.

Williams, D. J. & Matile-Ferrero, M. 2009. Mealybugs of Mauritius (Hemiptera: Coccoidea: Pseudococcidae). *Revue Française d'Entomologie* **31**: 97–101

Williams, D. J. & Watson, G. W. 1988. *The Scale Insects of the Tropical South Pacific Region. Pt. 2: The Mealybugs (Pseudococcidae)*. CAB International, Wallingford, U.K. 260 pp.

Wu, S. A. 2001. The tribe Antoninini of China (Homoptera: Coccoidea: Pseudococcidae). *Beijing Linye Daxue Xuebao* **23**: 43–48.

Yang, S. P. & Kosztarab, M. 1967. A morphological and taxonomical study on the immature stages of *Antonina* and of the related genera (Homoptera: Coccoidea). Research Division Bulletin Virginia Polytechnic Institute and State University, Blacksburg 3. 73 pp.

SCALE INSECTS (HEMIPTERA: COCCOIDEA) DAMAGING ENGLISH OAK TREES IN THE QUEEN ELIZABETH OLYMPIC PARK, LONDON

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ABSTRACT

Exceptionally large infestations of scale insects were observed in January 2014 causing dieback of apical twigs on nine semi-mature English oak trees planted in the Queen Elizabeth Olympic Park, London. Four species of scale insect were identified; the most abundant species and the one that appeared to be causing the most damage was *Asterodiaspis quercicola* (Bouché) (Asterolecaniidae). The trees had been imported from the Netherlands and planted in 2011 and it is highly probable that they were infested prior to export. This illustrates how the free movement of large plants for planting within the European Union can spread plant pests.

INTRODUCTION

A sample of apical twigs was collected on the 30 January 2014 by Joanna Wyzkiewicz and Mike Robinson of the Plant Health and Seeds Inspectorate (PHSI) from English oak (*Quercus robur* L. 'fastigiata Koster' 20–25 feathered (Fagaceae)) trees planted in the Athletes' Olympic Village complex in the Queen Elizabeth Olympic Park, London, E15. There were 12 oak trees in the garden, nine had been planted in 2011 and three in November 2013. All nine of the older trees appeared to have some degree of scale insect infestation whereas no scales were observed on the three recently planted trees. The trees were between 3.5–4.0 m high and all had been imported from southern Netherlands. The sample of oak twigs was submitted to The Food and Environment Research Agency (FERA) laboratory in York for analysis.

RESULTS AND DISCUSSION

Four species of scale insect were found to be smothering the twigs: Small Oak Pit Scale *Asterodiaspis quercicola* (Bouché) (Asterolecaniidae), Golden Oak Pit Scale *A. variolosa* (Ratzeburg), Zonate Armoured scale *Diaspidiotus zonataus* (Frauenfeld) (Diaspididae) and Oak Soft Scale *Parthenolecanium rufulum* (Cockerell) (Coccidae). There were also numerous detritivore mites present in association with the scale insects (Oribatida, Tydeidae and Acaridae).

The most abundant scale species and the one that appeared to be causing the most damage to the oak trees was *A. variolosa* (Plate 5, Figs 1–2). There were up to 48 scales per 2 cm length of apical twig and the bark of parts of the twigs was 100% covered in pit galls induced by the scales. The majority of the *A. variolosa* consisted of reproductive females (Plate 5, Figs 1–2) but also present were relatively large numbers of live overwintering adult females. Live scales were particularly dense beneath the previous one or two year's bud scales. *Asterodiaspis variolosa* is a Western Palaearctic species that has been introduced to North and South Africa, North America and New Zealand. It is widespread and common throughout Britain and feeds exclusively on *Quercus*. Only a small number of the closely related species *A. quercicola* were detected, consisting of live overwintering adult females (Plate 5, Fig. 3). This is also a Western Palaearctic species that has become almost

cosmopolitan. It has a similar distribution in Britain to *A. variolosa* and also feeds exclusively on *Quercus*. Some researchers consider *A. quercicola* to be a junior synonym of *A. variolosa* but this is not universally accepted (Malumphy, 2009; Ben-Dov, 2013). There were large numbers of live over-wintering second nymphal-instars (Plate 5, Fig. 4) and small numbers of reproductive adult female (Plate 5, Fig. 5) *P. rufulum* present. This is a European species that occurs widely in southern and central England. It is oligophagous on woody plants, but appears to be largely restricted to *Quercus* spp. in Britain. There were also large numbers of overwintering adult female *D. zonataus* (Plate 5, Fig. 6). This is a European species that is widespread and locally common in Britain but very rarely recorded as the adult females are highly cryptic, frequently being hidden from view beneath the outer epidermal layer of bark. It is oligophagous on woody plants, but exhibits a strong preference for *Quercus* spp.

Some of the oak trees supported unusually high population levels of scale insect which were causing, or at least contributing to, drying out and dieback of the apical twigs. This is likely to be due in part to the trees being stressed by abiotic factors and therefore being more susceptible to infestations of plant parasitic insects. The trees may have been stressed due for several reasons including being recently planted in an urban environment with an unsuitable substrate, high levels of pollution, water shortage or poor drainage, and the roots may not yet have fully established. The natural enemies (mainly parasitoid wasps and birds) that normally keep the scale insects numbers in check may be less common in London compared to more rural habitats, hence the unusually high levels of infestation. The infested oak trees had been imported from the Netherlands within the last three years. Scale insects have a low natural dispersal potential (adult females are wingless) and in Britain they usually take years to develop high population densities as they are univoltine. It is therefore highly likely that the trees were infested with all four species of scale insect when they were originally imported. Low population levels of scale insect would be virtually impossible to detect on larger, semi-mature plants during routine phytosanitary inspections prior to export. This illustrates how the free movement of large plants for planting within the European Union spreads plant pests (Smith *et al.*, 2007), and in many cases it can take years before an imported plant pest (or pathogen) population develops to a detectable (damaging) level. The planting of the Olympic Park prior to the London 2012 Olympic and Paralympic Games was an enormous project involving large numbers of mainly native woody plants (6,200 trees and 9,500 shrubs (Anon., 2013), including oak, ash, willow, birch, hazel, holly, blackthorn and hawthorn), many of which were imported. The development and planting of new areas of the Queen Elizabeth Olympic Park and East village is ongoing. It may take several years before an accurate assessment can be made of the pests and pathogens that were unintentionally introduced with imported plants during this development.

References

Anon., 2013. London Olympic's South Park. http://www.willerby-landscapes.co.uk/olympic-park1.html. Accessed 11 February 2014.

Ben-Dov, Y. 2013. ScaleNet, *Asterodiaspis*. http://www.sel.barc.usda.gov/catalogs/asterole/AsterodiaspisAll.htm. Accessed 11 February 2014.

Malumphy, C. 2009. A brief review of pit scales (Hemiptera: Asterolecaniidae) recorded in Britain. *Cecidology* **24**: 46–49, 64.

Smith, R. M., Baker, R. H. A., Malumphy C. P., Hockland S., Hammon R.P., Ostojá-Starzewski J. C. & Collins D. W. 2007. Recent non-native invertebrate plant pest establishments in Great Britain: origins, pathways, and trends. *Agricultural and Forest Entomology* **9**: 307–326.

THE HISTORY AND STATUS OF THE HAWTHORN SHIELDBUG *ACANTHOSOMA HAEMORRHOIDALE* (HEMIPTERA: ACANTHOSOMATIDAE) IN SCOTLAND, 1946–2008

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ABSTRACT

The status and recent distributional changes of the hawthorn shieldbug *Acanthosoma haemorrhoidale* (L.) in Scotland are discussed. The acanthosomatid is now widespread in central and southern regions and scarce in northern and north-west Scotland.

INTRODUCTION

The hawthorn shieldbug *Acanthosoma haemorrhoidale* (L.) (Acanthosomatidae) is a large and attractive shieldbug (Plate 6, Fig. 1) which has historically been a great rarity in Scotland, with few records prior to 1990. Recorded distribution of this species in Scotland is comparatively recent. Butler (1923) stated 'there is no record from Scotland' whilst Southwood & Leston (1959) noted that the British distribution of this species 'covers all England and Wales but it has only reached Cumberland and Durham recently'. Chinery (1997) summarised the European distribution of *A. haemorrhoidale* as occurring in 'much of Europe, but absent from Scotland'. More recent field guides such as Nau (2004) record it in Scotland. This paper summarises the historical distribution of the species in Scotland and the extent of its spread throughout southern and central Scotland from the 1990s to 2008.

HISTORY AND DISTRIBUTION

Recorded Distribution prior to 1990

The earliest recorded Scottish specimens were taken by D. K. Kevan in June 1946 at Kirkcudbright (VC73) (Fig. 1 and Table 1), and although overlooked by Southwood and Leston (1959) were subsequently reported by Hill (1973), and these are still present in the National Museum of Scotland (NMS) collection.

Acanthosoma haemorrhoidale was not recorded again in Scotland until 1959, when it was recorded from Rum (VC104) (Woodroffe, 1960). The following year it was again recorded from Rum and also from Bute (VC100). In 1969 *A. haemorrhoidale* was recorded in central Scotland for the first time from the Glasgow University Field Station at Rowardennan, Stirlingshire (VC86) on the eastern shore of Loch Lomond (Hill, 1973). In 1971 three specimens were taken in northern Kintyre (VC101) (Hill, 1973), but no further specimens were taken in Scotland until 1976, again in Kirkcudbright. Subsequent specimens were recorded in Wigtownshire (1982), Dumfries (1983 & 1988) and Drymen (1984) to the southwest of Loch Lomond, marking the beginning of a gradual range expansion throughout southern and central Scotland.

Changes in Distribution 1990–1999

Acanthosoma haemorrhoidale apparently spread slowly in Scotland between 1990 and 1995, with a total of 12 records (Table 2). It was recorded in Ayrshire and Bearsden for the first time in 1991, spreading north into Crieff, Perthshire (1992) and

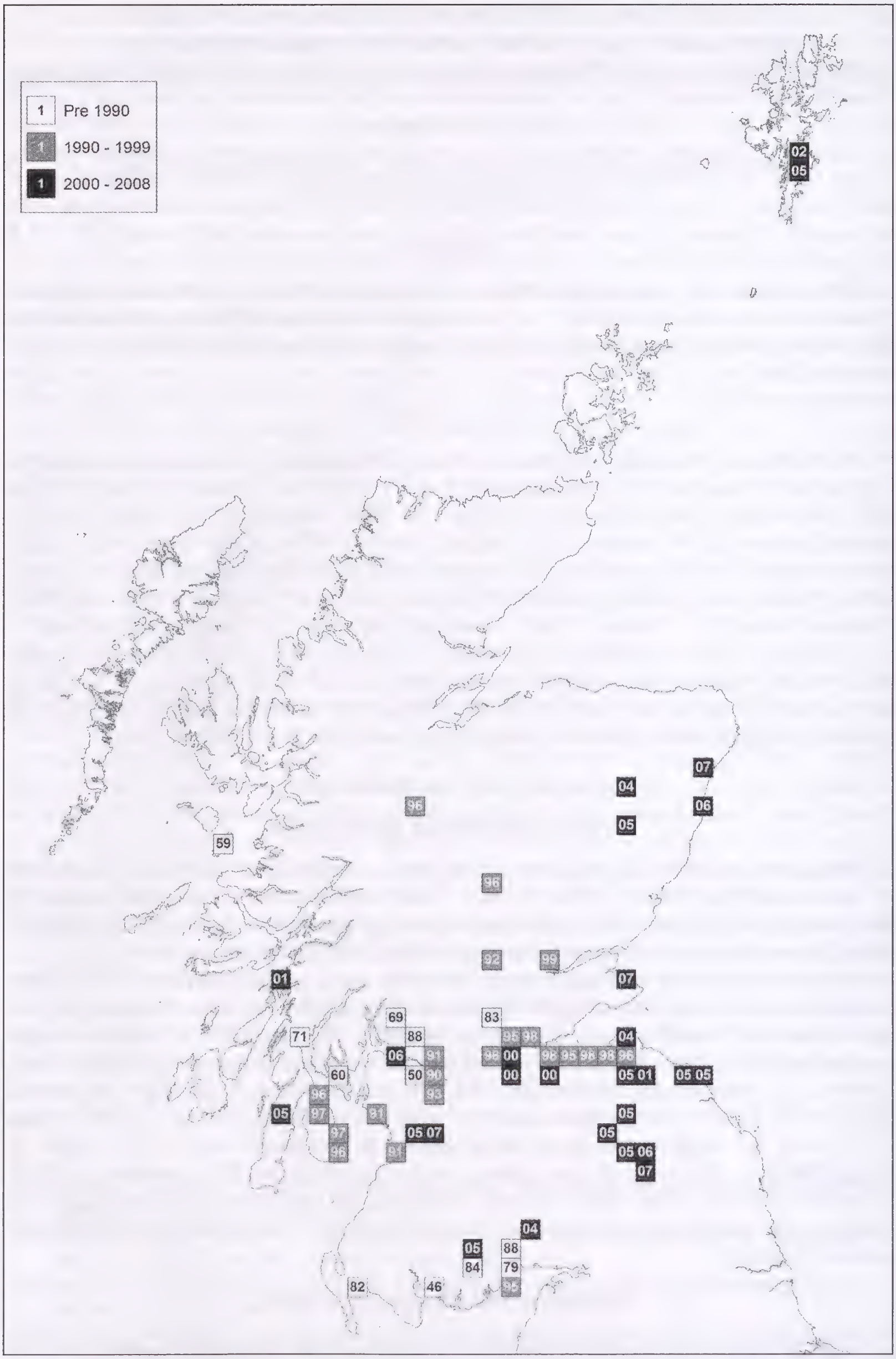

Fig. 1 Scottish records of *Acanthosoma haemorrhoidale* 1946–2008.

Table 1. Pre-1990 Scottish records of the Hawthorn Shieldbug *Acanthosoma haemorrhoidale*.

Vice County	Locality	OS Grid reference	Date	Recorder	Collection/ Reference
73	Near Gatehouse of Fleet	NX5956	1–22.vi.1946	D. K. Kevan	NMS: 2 exx.
73	Anwoth	NX5856	3.x.1946	D. K. Kevan	NMS: 6 exx.
76	Paisley	NS46	18.x.1950	Unknown	PAM: 1 ex.
104	Rhum	NM49	vii.1959	H. M. Russell	Woodroffe, 1960
104	Kinloch, Rum	NM4099	21.v.1960	G. E. Woodroffe	NMS: 1 ex.
100	Rothesay, Bute	NS088644	5.x.1960	D. F. E. Reynolds	NMS: 1 ex.
86	Rowardennan	NS376959	10.x.1969	C. C. Northen	UGM: 1 ex./ Hill, 1973
101	Stronachullin, Ardrishaig	NR850858	3.x.1971	A. McG. Stirling det. A. R. Hill	UGM: 3 exx./ Hill, 1973
83	Edinburgh	n.l.	18.xi.1976	D. McDonald	NMS: 1 ex.
73	Kirkconnell Flow	NX9769	5.iv.1979	A. B. Duncan	NMS: 1 ex.
74	Torrs Warren, Glenluce	NX15	28.v.1982	A. B. Duncan	NMS: 1 ex.
72	Blackchub, Dumfries	n.l.	21.ix.1983	A. B. Duncan	NMS: 1 ex.
73	Threave	NX7560	14.ix.1984	A. B. Duncan	NMS: 1 ex.
72	Dumfries	NX974756	10.v.1988	O. R. Sandison det. E. G. Hancock	KGM: 1ex./ Hancock, 1992
86	Drymen	NS48	19.viii.1988	C. Palma det. E. G. Hancock	KGM: 1 ex./ Hancock, 1992
86	Ross Wood, Loch Lomond	NS3796	3.ix.1989	S. M. Hewitt	KGM: 1 ex.
76	Johnstone	NS46	26.x.1989	J. E. Morgan	PAM: 1 ex.

n.l.: Grid reference not localised. Collections: KGM = Kelvingrove Museum & Art Gallery, Glasgow; PAM = Paisley Museum, Paisley; NMS = National Museum of Scotland, Edinburgh; UGM = University of Glasgow Museum

east into Glasgow (1993). Further records for West Lothian and Duddingston, Edinburgh show that it consolidated its range in the central belt of Scotland in the mid-1990s, with the Bawsinch, Duddingston record in 1995 marking the first recorded outdoor occurrence in Midlothian.

The number of records (35) of *A. haemorrhoidale* between 1996 and 1999 was considerably higher than in any previous decade (see Table 3). During this period *A. haemorrhoidale* consolidated its existing range in urban centres, with a number of records from Glasgow and Edinburgh, but was also recorded on the Isle of Arran for the time during 1996 and expanded its known range eastwards to East Lothian (1996) (see Fig. 1). In 1996 it was recorded at two sites north of the central belt at Bonskeid, Perthshire, and Fort Augustus, Inverness-shire (VC97), the most northerly known occurrence of the species in Scotland at that time.

Changes in Distribution 2000–2008

Further range consolidation of *A. haemorrhoidale* within the central belt of Scotland occurred between 2000 and 2001 (Table 4), however range expansion during this period was apparently limited, although it was recorded from Seil in western Scotland in 2001. Remarkably it was recorded from Shetland in 2002 (see Fig. 1) and again in 2005, however it is likely that these were accidental imports.

Table 2. Scottish records of the Hawthorn Shieldbug *Acanthosoma haemorrhoidale*, 1990–1995.

Vice County	Locality	OS Grid reference	Date	Recorder	Collection/ Reference
76	Oldhall, Paisley	NS506642	15.x.1990	BRISC	KGM: 1 ex. (R. Sutcliffe)
75	Ardrossan, Ayrshire	NS234430	i.1991	R. Griffith det. E. G. Hancock	KGM (Hancock, 1992)
75	Auchincruive, Ayrshire	NS3823	04.vi.1991	J. Pavely	KGM: 1 ex. (R. Sutcliffe)
99	Bearsden, Glasgow	NS5472	14.x.1991	K. Cohen det. E. G. Hancock	KGM: 1 ex. (Hancock, 1992)
88	Crieff, Perthshire	NN869223	17.i.1992	A. Abernethy	PM: 1 ex. (M. Simmons)
99	Bearsden, Glasgow	NS551734	22.iii.1992	R. Sutcliffe det. E. G. Hancock	KGM: 1 ex.
86	Stirling University campus, Stirling	NS8196	18.vii.1992	B. S. Nau	HNRS: several nymphs
76	Clarkston, Glasgow	NS5757	12.iv.1993	E. G. Hancock	KGM: 1 ex. (R. Sutcliffe)
77	Govanhill, Langside, Glasgow	NS585615	17.x.1994	E. G. Hancock	KGM: 1 ex.
73	Southwick, Mersehead	NX9156	28.viii.1995	S. Hewitt	M. Pollitt, DGERC, FR: 1 ex.
84	Bo'ness, West Lothian	NS999813	10.ix.1995	A. J. Ramsay	AJR: 1 ex.
83	Bawsinch, Duddingston, Edinburgh	NT284723	19.ix.1995	C. P. Rawcliffe	FR: 1 ex.

Abbreviations: AJR = Author's personal collection; BRISC = Biological Recording in Scotland Campaign; DGERC = Dumfries & Galloway Environmental Records Centre; FR = field record; HNRS = Heteroptera National Recording Scheme (Shieldbugs & allies); KGM = Kelvingrove Museum & Art Gallery, Glasgow; PM = Perth Museum, Perth.

Acanthosoma haemorrhoidale was recorded from northeast Scotland for the first time in 2004, and has subsequently been recorded at additional sites there (see Fig. 1), suggesting it is now successfully established.

The borders and southeast Scotland appear to have been colonised much later than other parts of Scotland, with the first records only during 2005, when the species was recorded at a number of sites (see Fig. 1). In 2005 *A. haemorrhoidale* was recorded in 11 new 10 km squares, suggesting that conditions that year were particularly favourable for colonisation, from the south of Kintyre, northeast to Aberdeenshire and southwest into the borders. Perhaps surprisingly, *A. haemorrhoidale* was not recorded in Fife until 2007, but it may have been overlooked. The author however made several field trips to Fife during the late 1990s without locating it.

Ecological notes

Hostplants of *A. haemorrhoidale* in Scotland would appear to be predominantly Hawthorn *Crataegus monogyna*. Hawkins (2003) lists 27 species of woody plants from which *A. haemorrhoidale* has been recorded in Surrey and recorded as breeding on 12 species, all in the family Rosaceae. In addition to hawthorn, *A. haemorrhoidale*

Table 3. Scottish records of the Hawthorn Shieldbug *Acanthosoma haemorroidale* 1996–1999.

Vice County	Locality	OS Grid reference	Date	Recorder	Collection/ Reference
77	Kelvingrove Park, Glasgow	NS570663	23.ii.1996	E. G. Hancock	JGM: 2 exx. (R. Sutcliffe)
88	South of Bonskeid, Perthshire	NN8860	16.iv.1996	K. Bland	NMS: 1 ex.
82	Hailes Mill, East Linton	NT577761	08.v.1996	R. Saville det. A. Gillespie	LRC
73	Kirkconnell Flow NNR	NX9769	12.vi.1996	A. Godfrey	FR
96	Loch carn a'Chuillin, Fort Augustus	NH4403	26.vi.1996	J. Watson det. S. Moran	IMAG: 1 ex.
100	Auchenhew Wood, I. of Arran	NS021219	28.vi.1996	A. J. Ramsay	AJR: 2 exx.
100	Auchenhew Wood, I. of Arran	NS021218	28.vi.1996	A. J. Ramsay	AJR: 1 exx.
86	Falkirk, Stirlingshire	NS887795	05.vii.1996	Y. Fellingham det. A. J. Ramsay	FR: 1 ex.
100	Lochranza, I. of Arran	NR938503	29.ix.1996	C. Powell det. A. J. Ramsay	AJR: 1ex.
77	Botanic Gardens, Glasgow	NS567676	13.x.1996	E. G. Hancock	KGM: 3 exx. (R. Sutcliffe)
100	Lochranza, I. of Arran	NR937502	28.x.1996	A. J. Ramsay	AJR: 1 ex.
84	Bo'ness, West Lothian	NS981808	30.xi.1996	A. J. Ramsay	AJR: 1 ex.
100	Glen Chalmadale, I. of Arran	NR948499	16.ii.1997	A. J. Ramsay	AJR: 1 ex.
100	Glen Chalmadale, I. of Arran	NR944499	21.ii.1997	A. J. Ramsay	AJR: 2 exx
100	Lochranza, I. of Arran	NR934503	15.iv.1997	A. J. Ramsay	AJR: 1 ex.
100	Cladach Sawmill, I. of Arran	NS014376	19.v.1997	Sawmill staff det. A. J. Ramsay	AJR: 1 ex.
76	Ralston, Paisley	NS4963	29.v.1997	S. Allan	KGM: 1 ex. (R. Sutcliffe)
99	Dawsholm Park, Glasgow	NS553702	17.xi.1997	D. Nicol	KGM: 1 ex. (R. Sutcliffe)
84	Kinningars Park, Bo'ness	NT015812	14.i.1998	A. J. Ramsay	AJR: 1 ex.
84	Kinneil Mills Farm, Birkhill	NS975875	25.i.1998	A. J. Ramsay	AJR: 1 ex.
84	Bo'ness, West Lothian	NS995812	25.iii.1998	H. Ramsay det. A. J. Ramsay	AJR: 1 ex.
84	South Queensferry, West Lothian	NT138778	v. 1998	A. J. Ramsay	FR: 1 ex.
82	Seton Sands, East Lothian	NT429761	19.ix.1998	R. Saville det. A. Gillespie	LRC
83	Newhailes Estate near Edinburgh	NT3272	19.ix.1998	K. Bland	LRC
83	Granton-Crewe disused railway	NT233772	22.ix.1998	R. Saville det. A. Gillespie	LRC
83	Braidburn Valley, Edinburgh	NT242703	23.x.1998	R. Saville det. A. Gillespie	LRC

(continued)

Table 3. Scottish records of the Hawthorn Shieldbug *Acanthosoma haemorroidale* 1996–1999. *(continued)*

Vice County	Locality	OS Grid reference	Date	Recorder	Collection/ Reference
83	Morningside, Edinburgh	NT2471	23.x.1998	R. Saville	LRC
83	Craigroyston, Edinburgh	NT219771	22.xii.1998	R. Saville det. A. Gillespie	LRC
83	N. Merchiston Cemetery, Edinburgh	NT234723	04.iv.1999	R. Saville det. A. Gillespie	LRC
83	Pilrig Park, Edinburgh	NT265758	14.iv.1999	R. Saville det. A. Gillespie	LRC
83	Portobello, Edinburgh	NT303733	29.v.1999	D. Sivell det. A. Gillespie	LRC
83	Figgate Burn Park, Edinburgh	NT301736	29.v.1999	D. Sivell det. A. Gillespie	LRC
83	Leith to Seafield disused railway	NT272753	29.vi.1999	R. Saville det. A. Gillespie	LRC
83	Hawkhill Wood, Edinburgh	NT2971	19.ix.1999	K. Bland	LRC
89	Scone, Perth	NO138255	01.x.1999	M. Simmons	PM:1 ex.

Abbreviations: AJR = Author's personal collection; FR = field record; IMAG = Inverness Museum & Art Gallery; KGM = Kelvingrove Museum & Art Gallery, Glasgow; LRC = Lothian Records Centre; NMS = National Museum of Scotland, Edinburgh; PM = Perth Museum, Perth.

in Scotland has been recorded from Willow *Salix* spp., *Rhododendron ponticum*, Birch *Betula* spp., *Sorbus* spp (domestic cultivars), Rowan *Sorbus aucuparia*, Elm *Ulmus* spp., and Elder *Sambucus nigra*, although it is unlikely that all of these species are utilised as foodplants (see Hill, 1973). Confirmed breeding on species other than *C. monogyna* in Scotland has been observed only on *Cotoneaster bullata*, a large leaved species of *Cotoneaster* (pers. obs.). Small-leaved species of *Cotoneaster* do not appear to be utilised and this may be due to the area required by females to lay a single egg batch.

Scottish data suggest that adults enter hibernation from October, when adults occur under bark of a variety of trees including Alder *Alnus glutinosa*, Beech *Fagus sylvatica*, Goat Willow *Salix caprea* and Wych Elm *Ulmus glabra*. During winter *A. haemorrhoidale* has also been recorded from Yew *Taxus baccata*, suggesting that evergreen trees may provide additional hibernation sites. It is likely that other trees are utilised, and the number of records from indoors during the winter months suggests that a proportion of adults may hibernate in sheds and outbuildings where these are close to breeding habitats. Further south adults hibernate in leaf litter but there is only one record for this from Scotland, with a single adult recorded from compost in December (Kelvinbridge, Glasgow, 17.xii.2006, Table 4). Data for adults recorded in Scotland suggest emergence from early April onwards (Tables 1–4) and adults are apparently active until June.

Few records are available for nymphs in Scotland, with records between July and September (Tables 2 and 4), with adults observed from August until October prior to hibernation (Tables 1–4). Dolling (1991) notes that *A. haemorrhoidale* has an annual

life cycle, with a single generation per year, however generations can overlap, as adults have been recorded in every month of the year in Scotland (see Tables 1–4). Flight in adults has been observed during May (South Queensferry, 1998, pers. obs.). Habitats include gardens, parkland habitats including municipal parks, botanic gardens, and cemeteries, woodland and farmland hedgerows wherever suitable hostplants are present. The majority of records are from urban areas.

Discussion

Acanthosoma haemorrhoidale is a comparatively large insect, although it can often be difficult to locate. Kevan apparently did not publish his finds of this species in Kirkcudbright, and it may be that such a common species south of the border did not warrant mention. There are certainly more records of this species in Scotland since 1990, and it is possible that the succession of warm summers during the late 1990s and mid 2000 could have resulted in more records, however it is also noteworthy that a number of local Records Centres have become more active in the same period, possibly leading indirectly to an apparent increase in records.

Within northern Europe the expansion of *A. haemorrhoidale* has also been recorded in Finland between 1920 and 1950 (Southwood & Leston, 1959), however it is still restricted to the south of Finland (Rintala & Rinne, 2011). Within the British Isles *A. haemorrhoidale* has apparently slowly expanded its range, as it was unknown in northern England until the 1950s (Southwood & Leston, 1959). Although *A. haemorrhoidale* was already present in southwest Scotland by 1946, it is unclear whether this represents a relict population from a previous expansion, as many other predominantly southern species occur only in southwest Scotland e.g. beetles (Crowson, 1966) and bushcrickets (Marshall & Haes, 1988) or the first beginnings of range expansion. *Acanthosoma haemorrhoidale* occurs throughout Ireland to the northern counties (Southwood & Leston, 1959), but unlike in Britain there is no evidence of more recent range expansion as it has been recorded throughout Ireland prior to 1935 (Halbert, 1935).

It was not until 1996 that *A. haemorrhoidale* became more frequently recorded in Scotland. This is not consistent with published data from the south of England over the same time period. *Acanthosoma haemorrhoidale* population trends were recorded by Hawkins (2003) in Surrey between 1983 and 2003. He observed *A. haemorrhoidale* regularly but rarely between 1983 through to 1992, with highest populations in 1993, and a subsequent decline between 1994 and 1997. Populations in Surrey recovered again to become more abundant during 2000–2003.

These population trends differ from those observed in Scotland, as during 1993 very few *A. haemorrhoidale* were recorded, and Scottish populations apparently increased during 1996, during which populations in the south of England were in decline. In 2003 Scottish populations apparently declined, whereas those in the south of England increased, suggesting that factors which affect populations in the south of England are not the same as those which affect Scottish populations. The effect of recorder 'bias' cannot be ruled out in Scotland, as the increased number of records during this period may simply reflect increased recorder effort. Nevertheless it should be noted that prior to the 1990s very few records of this shieldbug were received by museums in Scotland, suggesting that populations really have increased.

Prior to the recent apparent expansion, the distribution of the *A. haemorrhoidale* was centred around southwest Scotland, with a long established population in Kirkcudbright and an outlying population on Rum (VC104). Woodroffe (1960) even suggested the Rum population indicated an undetected native northern population.

Table 4. Scottish records of the Hawthorn Shieldbug *Acanthosoma haemorrhoidale*, 2000–2008.

Vice County	Locality	OS Grid reference	Date	Recorder	Collection/ Reference
83	Lauriston Castle, Edinburgh	NT203758	15.ii.2000	R. Saville	LRC
84	Polkemmet Country Park, Whitburn	NS925651	16.iv.2000	R. Saville det. A. Gillespie	LRC
84	Muiravonside Country Park, West Lothian	NS969753	18.vi.2000	R. Saville det. A. Gillespie	LRC
82	Luffness Mains, Aberlady, East Lothian	NS485795	13.xi.2000	R. Harbison	LRC
83	Currie, Midlothian	NT1667	29.xii.2000	J. Finn det. A. Gillespie	LRC
83	Lauriston Castle, Edinburgh	NT204760	16.iii.2001	R. Saville	LRC
83	Lochend, Edinburgh	NT275746	05.iv.2001	R. Saville	LRC
83	Calton Hill, Edinburgh	NT262743	19.v.2001	S. Maxwell	LRC
83	Lochend, Edinburgh	NT273746	19.v.2001	R. Saville	LRC
83	Calton Hill, Edinburgh	NT262744	19.v.2001	R. Saville	LRC
83	Pilrig Park, Edinburgh	NT265758	22.v.2001	R. Saville	LRC
83	Dalry Community Park, Edinburgh	NT237726	11.vi.2001	R. Saville	LRC
98	Oban Seil Farm, Seil	NM771182	09.viii.2001	S. Brooke	FR: 1 ex. (3rd instar nymph)
83	Malleny Garden, Balerno	NT165665	16.ix.2001	R. Saville det. A. Gillespie	LRC
88	Perthshire	n.l.	19.xii.2001*	MoP det. M. Simmons	PM: 1 ex. (M. Simmons)
112	Lerwick, South Mainland, Shetland	HU4741	16.vi.2002	M. Gray det. P. V. Harvey	FR: 1 ex, SBRC (P. Harvey)
84	Bo'ness, West Lothian	NS995812	10.viii.2002	A. J. Ramsay	FR: several nymphs
92	Asloun, Alford	NJ542147	28.viii.2004	I. Francis	FR: 1 ex. NESBRC (I. Lawrie)
82	North Berwick, East Lothian	NT541848	23.ix.2004	A. Sumner	LRC
82	Nr Kingston, East Lothian	NT528824	24.ix.2004	A. Sumner	LRC
72	Castle Loch, Culshabbin, Dumfries	NY087812	15.x.2004	A. White	FR: 1ex. DGERC (M. Pollitt)
82	North Berwick, East Lothian	NT541848	01.xii.2004	A. Sumner	LRC
88	Perthshire	n.l.	06.i.2005*	MoP det. M. Simmons	PM: 1 ex. (M. Simmons)

(continued)

Table 4. Scottish records of the Hawthorn Shieldbug *Acanthosoma haemorrhoidale*, 2000–2008. *(continued)*

Vice County	Locality	OS Grid reference	Date	Recorder	Collection/ Reference
81	Coldingham, Eyemouth, Berwickshire	NT904661	13.iv.2005	F. Evans	FR: 1 ex. SBBRC (I. Carle)
75	Dean Castle Country Park, Ayrshire	NS434392	21.iv.2005	Unknown	NBN data accessed 08/02/08
75	Dean Castle Country Park, Ayrshire	NS437397	03.vi.2005	Unknown	NBN data accessed 08/02/08
81	Fairlaw, Auchencrow	NT856615	20.vi.2005	L. Turnbull	FR: 1 ex. SBBRC (I. Carle)
101	Grianain Forest, Carradale, Kintyre	NR7941	21.vi.2005	A. Halstead	FR: 1 ex. (R. Sutcliffe)
84	Bo'ness, West Lothian	NS995812	03.viii.2005	A. J. Ramsay	FR: 1 ex.
82	Townhead Farm, Gifford, East Lothian	NT552684	04.viii.2005	A. J. Ramsay	AJR: 1 ex.
80	Lilliesleaf, Melrose, Roxburghshire	NT534251	10.viii.2005	I. Amott	FR: 1 ex. SBBRC (I. Carle)
79	Galashiels	NT481369	17.viii.2005	L. Aitken	FR: 1 ex. SBBRC (I. Carle)
84	Bo'ness West Lothian	NS995812	21.viii.2005	A. J. Ramsay	FR: several nymphs
88	Perthshire	n.l.	24.viii.2005*	MoP det. M. Simmons	PM: 1 ex. (M. Simmons)
73	Corsock, Dumfries	NX757766	03.ix.2005	M. Pollitt	FR: 1 ex. DGERC (M. Pollitt)
92	Aboyne, S. Aberdeenshire	NO524979	09.ix.2005	N. A. Littlewood	NAL: 1 ex.
88	Perthshire	n.l.	12.ix.2005*	MoP det. M. Simmons	PM: 1 ex. (M. Simmons)
75	Dean Castle Country Park, Ayrshire	NS437394	29.ix.2005	Unknown	NBN data accessed 08/02/08
81	Stables, Harry Burn, Lauder	NT524483	x.2005	J. Mercer	FR: 1 ex. SBBRC (I. Carle)
88	Perthshire	n.l.	06.x.2005*	MoP det. M. Simmons	PM: 1 ex. (M. Simmons)
75	Dean Castle Country Park, Ayrshire	NS440394	27.x.2005	Unknown	NBN data accessed 08/02/08
77	Maryhill, Glasgow	NS567689	16.xi.2005	P. Dower	KGM: 1 ex. (R. Sutcliffe)

(continued)

Table 4. Scottish records of the Hawthorn Shieldbug *Acanthosoma haemorrhoidale*, 2000–2008. *(continued)*

Vice County	Locality	OS Grid reference	Date	Recorder	Collection/ Reference
112	Cunningsburgh, South Mainland, Shetland	HU4330	17.xii.2005	J. Nicolson det. P. V. Harvey	FR: 1 ex. SBBC (P. Harvey)
80	Harestanes Countryside Visitors Centre, Borders	NT6424	11.i.2006	A. Forman	FR: 1 ex. SBRC (P. Harvey)
75	Dean Castle Country Park, Ayrshire	NS436394	28.i.2006	Unknown	NBN data accessed 08/02/08
99	Kirktonhill, Dumbarton	NS3874	30.viii.2006	K. & S. Futter	KGM: 1 ex. (R. Sutcliffe)
99	Garscube Allotments, Dawsholm Park, Glasgow	NS558699	13.viii.2006	R. Sutcliffe	KGM: 1 ex. (R. Sutcliffe)
76	Waulkmill Glen, Barrhead	NS522579	07.ix.2006	R. Sutcliffe	KGM: 1 ex. (R. Sutcliffe)
92	Aberdeen Aberdeenshire	NJ932063	13.ix.2006	N. A. Littlewood	FR: 1ex. (N. Littlewood)
77	Kelvinbridge, Glasgow	NS577670	17.xii.2006	C. Scott	KGM: 1 ex. (R. Sutcliffe)
92	Aberdeen, Aberdeenshire	NJ932063	03.iv.2007	N. A. Littlewood	FR: 1 ex. (N. Littlewood)
77	Railway station underpass, Hyndland, Glasgow	NS553675	29.iv.2007	R. Weddle	KGM: 1 ex. (R. Sutcliffe)
75	Newmilns, Ayrshire	NS536372	25.v.2007	F. Woodward	KGM: 1 ex. (R. Sutcliffe)
85	Fife minor road towards Prior Moor	NO5113	vii–viii 2007	D. Lampard	DM: 1 ex. (D. Lampard)
93	Hill of Logie, Logie Buchan Estate, Ellon	NJ9729	02.ix.2007	N. A. Littlewood	FR: several nymphs (N. Littlewood)
77	Hyndland, Glasgow	NS556676	05.x.2007	R. Weddle	KGM: 1 ex. (R. Sutcliffe)
80	Todlaw Wells Plantation, Hundalee, Jedburgh	NT633187	14.x.2007	I. Carle det. A. J. Ramsay	FR: 1 ex. SBBRC (I. Carle)
84	Bo'ness, West Lothian	NS995812	iv.–v.2008	H. Ramsay det. A. J. Ramsay	FR: 2 exx.

Abbreviations: AJR = Author's personal collection; DGERC = Dumfries & Galloway Environmental Records Centre; DM = Dundee Museum; FR = field record; IMAG = Inverness Museum and Art Gallery; KGM = Kelvingrove Museum & Art Gallery, Glasgow; LRC = Lothian Records Centre; MoP = Member of public; NAL = Nick Littlewood collection; NBN = National Biodiversity Network; NESBRC = North East Scotland Biological Records Centre; NMS = National Museum of Scotland, Edinburgh; PM = Perth Museum, Perth; SBBRC = Scottish Borders Biological Records Centre; SBRC = Shetland Biological Records Centre. *Date of specimen may not be when specimen was found.

It is possible that *A. haemorrhoidale* may have been accidentally imported during the Nature Conservancy Council's tree planting programme on the island, which began in 1958 (Stiven & Smith, 2005). Old records show that the majority of woodland on Rum had been removed by 1796, and later plantings associated with the estate around Kinloch castle did not apparently include *C. monogyna* (Stiven & Smith, 2005). Still, small remnants of woodland which included hawthorn remained in coastal gulleys, cliffs and rocky areas on Rum (Stiven & Smith, 2005). However it is unlikely that many of these plants retained sufficient berries to sustain populations of hawthorn shieldbug, and it is far more likely that the shieldbug was accidentally imported to the island.

Acanthosoma haemorrhoidale is now well established in southern and central Scotland (Fig. 1), with small outlying populations present on Rum, in West Inverness and in north-east Scotland, but apparently absent from upland areas, as befits a lowland woodland insect.

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References

Butler, E. A. 1923. *A biology of the British Hemiptera-Heteroptera*. Witherby, London.

Chinery, M. 1997. *Garden Insects*. Collins, London.

Crowson, R. A. 1966. Refuges for warmth-loving species along the Scottish Solway Coast. *Entomologist's monthly Magazine* **102**: 245–246.

Dolling, W. R. 1991. *The Hemiptera*. Oxford University Press, Oxford.

Halbert, J. N. 1935. A List of the Irish Hemiptera (Heteroptera and Cicadina) *Proceedings of the Royal Irish Academy. Section B: Biological, Geological, and Chemical Science* **42**: 211–318.

Hancock, E. G. 1992. Assymetrical antennae in the hawthorn shieldbug *Acanthosoma haemorrhoidale* (L.). *British Journal of Entomology & Natural History* **5**: 93–4.

Hawkins, R. 2003. *Shieldbugs of Surrey*. Surrey Wildlife Trust, Woking.

Hill, A. R. 1973. Invertebrate short notes: hawthorn shieldbug. *Glasgow Naturalist* **19**: 59.

Marshall, J. A. & Haes, E. C. M. 1988. *Grasshoppers and allied insects of Great Britain and Ireland*. Harley Books, Colchester.

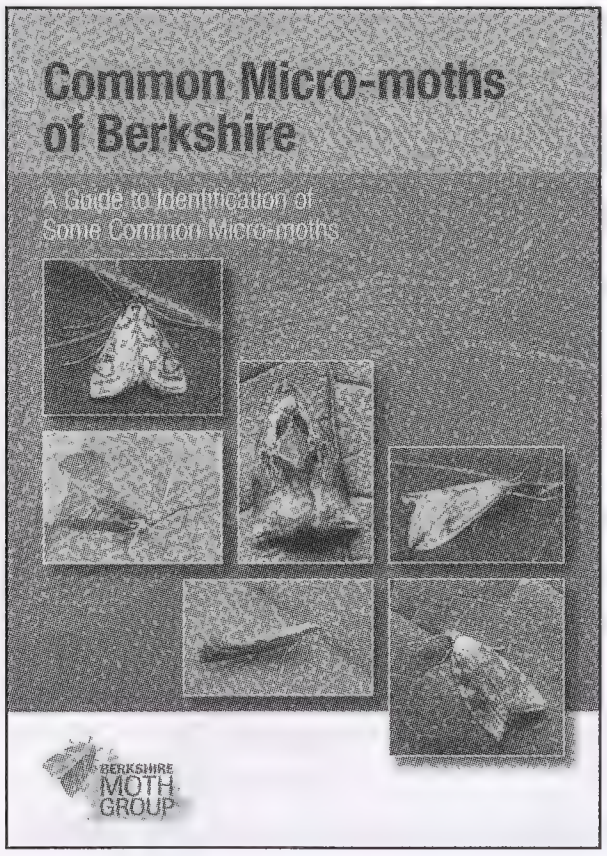
Nau, B. S. 2004. *Guide to Shieldbugs of the British Isles*. Field Studies Council, Taunton.

Rintala, T. & Rinne, V. 2011. *Suomen Luteet* [Finnish Bugs] (2nd ed.). Tibiale, Helsinki.

Southwood, T. R. E. & Leston, D. 1959. *Land and water bugs of the British Isles*. Warne, London.

Stiven, R. & Smith, M. 2005. Lessons learned from tree planting on Rum National Nature Reserve, 1957–2004. *Scottish Natural Heritage Commissioned Report No. F02LD08*, Scottish Natural Heritage, Fort William.

Woodroffe, G. E. 1960. Notes on some Hemiptera-Heteroptera from the Isle of Rhum. *Entomologist's monthly Magazine* **96**: 144.



BOOK REVIEW

Common Micro-moths of Berkshire. A Guide to Identification of some Common Micro-moths by Berkshire Moth Group (ed.) Nick Asher. (Berkshire Moth Group Publishing, 2013). Softback 143pp. £10.00. ISBN 978-0-9926981-0-2.

Though small in size, this book is densely packed with information on the 103 commonest species of micro-lepidoptera found in Berkshire. It was painstakingly assembled and edited, mostly by Nick Asher but with assistance from other members of the Berkshire Moth Group, so it draws on over 200 years of expertise and experience from this group of lepidopterists.

I have had reason to resort to it since acquiring a pre-publication copy and can say I have found it to be very useful and informative. Intended as an identification guide, it is richly populated with photographs of the subjects in life, together with photos of similar, though often rarer species they could be confused with.

After sections detailing the Watsonian vice county of Berkshire and the terminology used for describing the taxonomic features of importance there is a thumbnail index of the species covered. This is followed by text entries for each of the species with copious plates, many showing the range of variation. Importantly, on the illustrations, key features of the wing and other markings important for identification are indicated clearly with numbered arrows. Where appropriate, this enables comparison with the wing markings etc. of similar species which are also illustrated along-side. Many of these figures have inserts of the moth life-size. Remarkably this little book contains over 400 photographs of its subjects, almost exclusively in their natural resting positions. There are also tetrad distribution maps and graphs of the flight times in Berkshire for each of the species covered in the book, along-side text describing their status, habitat and distinctive features. The book concludes with an appendix giving the Berkshire records of similar species mentioned in the main body, and a usable index (quite a novelty in this day and age!).

Of course, the geographic area covered is that of Watsonian vice-county 22 but the subject matter, being the commonest micro moths of that county, is equally applicable to many other parts of southern and central England, and indeed parts of Northern Europe. So the potential readership for this work is large.

As with any book of this sort, there are a few typos in the text. These include unclear photographic citations (two photographers with the initials JH); the wrong food plant for *Paracrania chrysolepidella* on p. 16; the figure of *Celypha rurestrana* on p. 71 is in fact *C. lacunana*; larvae of *Agriphila straminella* are subterranean gallery feeders not internal stem feeders (p. 89); a figure on page 106, where a variety identified as being of *Pyrausta purpuralis* is in fact a variety of *P. aurata* and the photograph captioned *Eana incanana* (p. 63) is not that species, though its identity is unknown.

All-told, this book is a terrific addition to our lepidopteran literature and incredible value at £10.00. Many congratulations to Nick and the BMG.

IAN SIMS

STREPTANUS OKAENSIS (HEMIPTERA: CICADELLIDAE) – A SPECIES OF LEAFHOPPER NEW TO BRITAIN FROM SOUTH YORKSHIRE

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ABSTRACT

The cicadellid leafhopper *Streptanus okaensis* Zachvatkin is reported as new to Britain from Inkle Moor, South Yorkshire (VC63). An illustrated comparison is made with the most closely related British species, *S. sordidus* (Zetterstedt). Several specimens were identified in a pitfall trap sample from a survey of fen habitat undertaken during 2012. On the continental mainland the species is reported from north Germany, most of Scandinavia, Poland, northern and central Russia to eastern Siberia. In Germany the host plant is Purple Small-reed *Calamagrostis canescens* with other small-reed species possibly also utilised in other parts of its range. The species is thought to be indigenous to the British fauna but has been overlooked due to the difficulty of sampling its habitat and for being mistaken for other related species.

INTRODUCTION

Eight male and two female specimens of *Streptanus okaensis* Zachvatkin were identified from a batch of Hemiptera specimens sent to one of the authors (JF) for identification by the Thorne and Hatfield Moors Conservation Forum (Plate 6, Fig. 2). These were collected during an invertebrate survey of Inkle Moor, a privately-owned area of land located on the northwest margins of Thorne Moor (and not part of Thorne Moor National Nature Reserve) conducted during spring, summer and autumn 2012. Pit-fall and aerial water-traps were set at three locations within the site. These locations (A, B and C) were selected for their contrasting vegetation types, although all contained an element of tall herb fen of varying composition. Location A comprised areas of willow *Salix* sp. carr and tall herb fen where Common Reed *Phragmites australis* was dominant. Location B was a tall herb fen dominated by Purple Small-reed *Calamagrostis canescens* and accompanied by a wide range of other fen species such as Yellow Loosestrife *Lysimachia vulgaris* and Skullcap *Scutellaria galericulata*. Location C was also a tall herb fen with dominant common reed but also with frequent stands of Common Nettle *Urtica dioica*, Rosebay Willowherb *Chamerion angustifolium* and Purple Loosestrife *Lythrum salicaria*.

Each location comprised a number of sampling points (a combination of pitfall and aerial traps). All specimens of *S. okaensis* were found in a pitfall trap from location B and were taken between 9.vii.2013 and 27.viii.2013.

Over forty species of Hemiptera were recorded from the site. A large proportion of the catch comprised specimens of Auchenorrhyncha (plant and leafhoppers) and males were found to be particularly frequent. Where necessary, males were dissected to confirm identification. The English translation of The Plant and Leafhoppers of Germany by Robert Biedermann and Rolf Niedringhaus (2009) was used to identify Auchenorrhyncha to species level. Confirmation of identification was obtained

from Dr Alan Stewart, Organiser of the UK National Recording Scheme for Auchenorrhyncha at Sussex University, who examined three male *Streptanus* specimens. These were forwarded to Dr Michael Wilson at the National Museum of Wales in Cardiff where these were compared with specimens from Finland held in the collections there and which also confirmed the identification.

Two male specimens of *S. sordidus* (Zetterstedt) previously collected from Inkle Moor by the late Dr Peter Skidmore on 16.viii.1990 and held in the collection of one of the authors (SF) were found, on re-examination, to be *S. okaensis*. These, therefore, constitute the first record of the species in Britain.

A series of visits was made by the authors to nearby Thorne Moor during 2013 to sample stands of *C. canescens* in order to ascertain further the status of *S. okaensis* in nearby areas where the host plant is found to be relatively common. During the final visit made on 1.x.2013, a vacuum sampler was used to sample a medium-sized stand of *C. canescens* on the western fringe of the moor some 600m distance from where the 2012 Inkle Moor specimens were collected. A single male specimen of *S. okaensis* was obtained from this location.

Description

Hitherto three species of *Streptanus* were known to occur in Britain: *S. aemulans* (Kirschbaum), *S. marginatus* (Kirschbaum) and *S. sordidus*. Their identification is dealt with by Le Quesne (1969) and all may be distinguished from each other by a combination of features including the shape of the pronotum and vertex and their markings. Other features used are genital plates of males, and the seventh abdominal sterna in females. The most important feature, however, is the male aedeagus which in all three is sufficiently distinctive to be diagnostic.

Identification of *S okaensis* is dealt with by Zachvatkin (1948), Ossiannilsson (1983), della Giustina (1989), Bednarczyk and Gêbicki (1998) and Biedermann & Niedringhaus (2009). Of the hitherto three British species it is *S. sordidus* that most closely resembles *S. okaensis* in the structure of the male genitalia (Figs 1, 2 & 3). In both these species there are single teeth on each margin of the stem of the aedeagus near to its base. When the aedeagus of *S. sordidus* is viewed laterally, the teeth on each margin are of almost similar size (Fig 2a). In *S. okaensis* the tooth on the left margin is larger than the one on the right and lies much closer to the apex of the aedeagus than in the case of *S. sordidus* (Fig. 2c). In *S. okaensis* the apex of the aedeagus also has a distinctly truncated outline and in all the specimens from Inkle Moor these are significantly pale towards the apical margins (Fig. 1a). In *S. sordidus* the apex is elongated and more rounded with more extensive pigmentation so the apical margins are much less pale in contrast to the rest of the apex (Fig 1b). In *S. aemulans* there is a single weak tooth on the stem of the aedeagus near the base and in *S. marginatus* there is no tooth to be seen.

There appears to be an inconsistency in some of the descriptions of the aedeagus in the literature. In all the British specimens so far obtained, the larger tooth of the base of the aedeagus stem is on the left margin when viewing the phallotreme dorsally (as in Fig. 1b). These conform to Ossiannilsson (1983), Bednarczyk and Gêbicki (1998) and Biederman & Niedringhaus (2009) where an orientation of the illustration of the phallotreme into the dorsal position would also show the larger tooth on the left margin. In contrast, if the phallotreme of the aedeagus illustrated in Zachvatkin (Fig. 3) is orientated to the dorsal position the larger tooth appears on the right margin of the stem. The illustration in Della Giustina (1989), of a German specimen, also follows this. Examination of Russian specimens was recently conducted by Professor

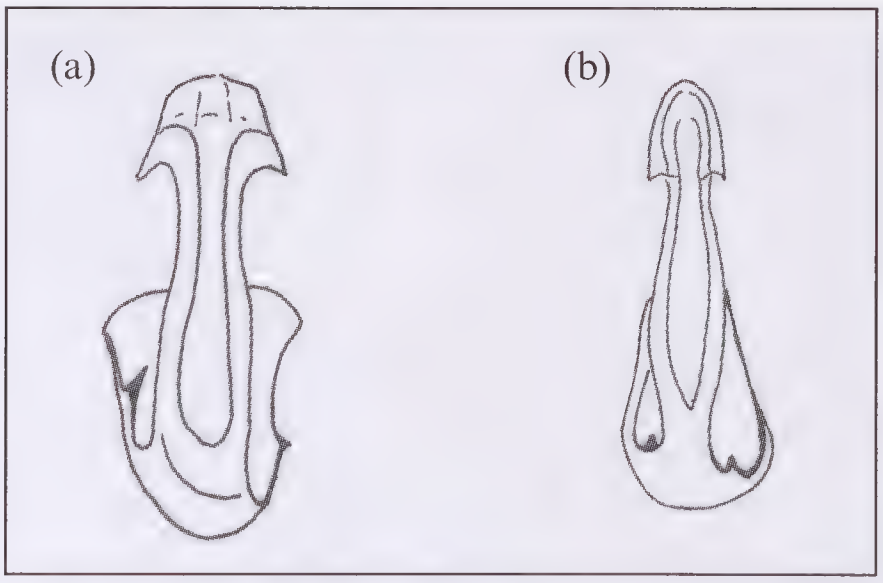


Fig. 1. Dorsal view of adult male aedeagus.
a: *Streptanus okaensis;* b: *Streptanus sordidus.*

G. Anufrief (the type specimens collected by Zachvatkin cannot be located, pers. comm, Dr. Dmitri Tishechkin, Moscow State University) and these indicate the aedeagus illustrations in Zachvatkin (1948) and della Giustina (1989) are the result of a printing error or an editorial oversight. The larger tooth is on the left margin.

In British specimens of *S. okaensis* the forewing veins are mainly pale with variable dark markings along the edges of the cells. Late in the season specimens are often darker, when the usually distinctive 'double spot' markings in the inner costal cell and anteriorly adjacent cell become lost in the general darker colouration. The male specimens so far found are sub-macropterous with the apex of the forewing reaching abdominal segment 10, and the females with the tip of the forewing reaching segment 8, although macropterous forms are known to occur in both sexes (Ossiannilsson, 1983). In females the posterior edge of the seventh abdominal sternite (Fig. 4) has a more acute tooth and surrounding dark pigmentation is less blurred at the edges

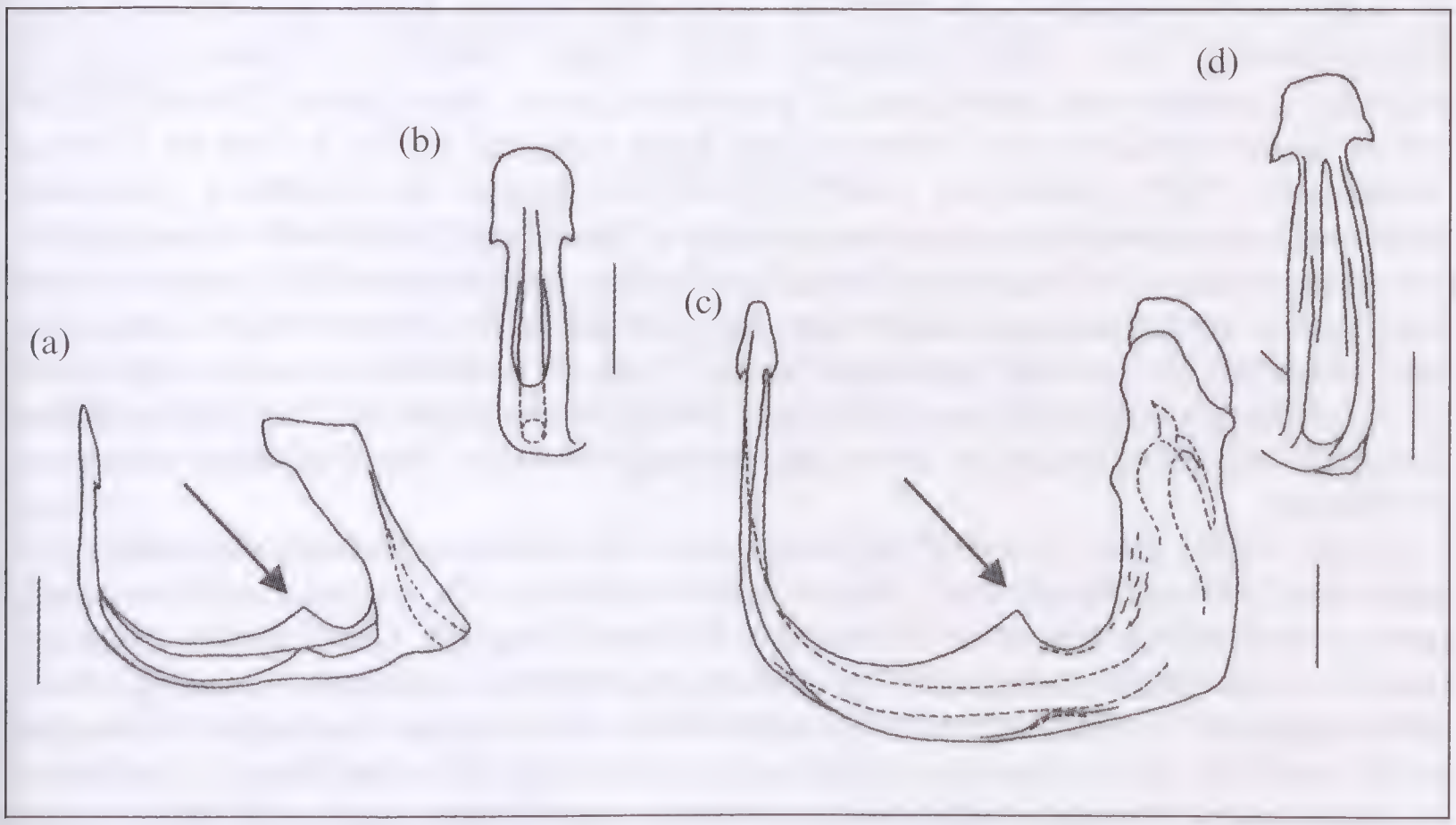


Fig. 2. After Biedermann & Niedringhaus (2009).
a, c = Lateral view of adult male aedeagus; b, d = apical half of aedeagal stem (phallotreme).
Streptanus sordidus: a, b; *Streptanus okaensis* c, d.

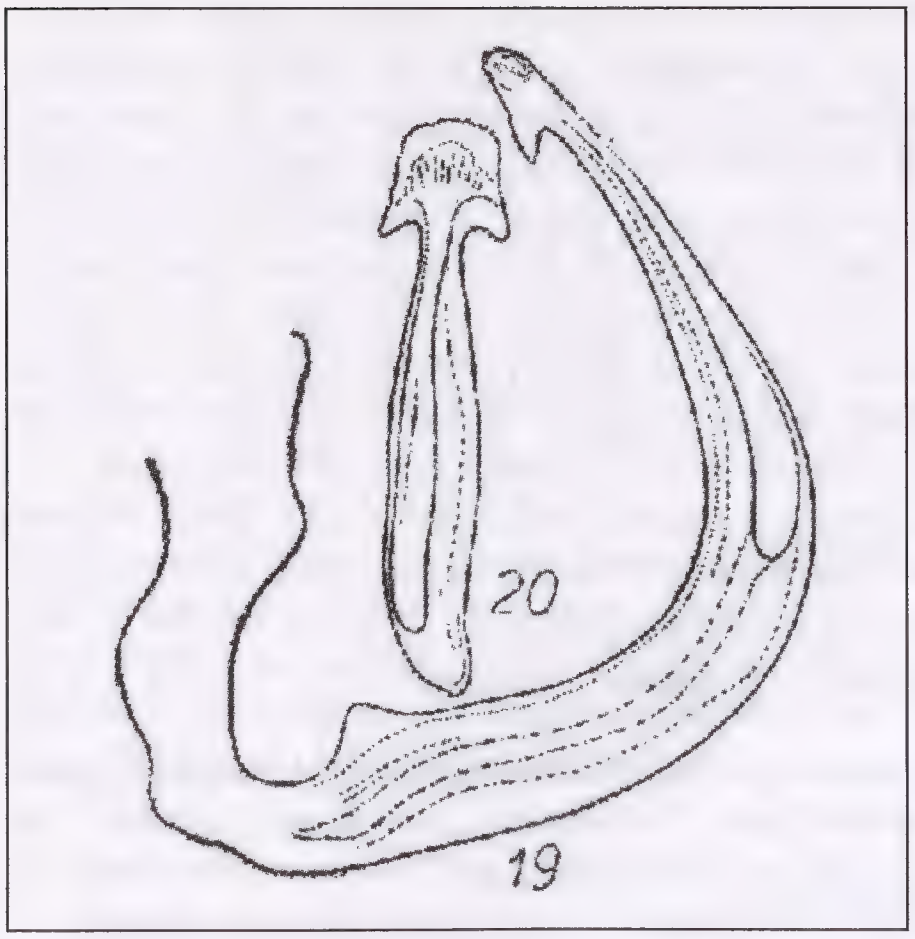


Fig. 3. Illustration of the aedeagus (19) and phallotreme (20) of *Streptanus okaensis* in the description published by Zachvatkin in 1948 (by permission).

(recalling a bird in flight) than in *S. sordidus*, *S. aemulans* and *S. marginatus* (all illustrated in Ossiannilsson, 1983).

Ecology and distribution

In common with other *Streptanus* species, all stages of *S. okaensis* are markedly terrestrial and live close to the ground surface. There is limited information available on the precise ecology of *S. okaensis* but the main sources quote the hosts as species of Small-reed *Calamagrostis* spp., in particular Purple Small-reed *C. canescens* (Ossiannilsson, 1983, della Giustina, 1989, Nickel, 2003) in Germany and, in addition, Scandinavian Small-reed *C. phragmitoides* in Scandinavia (Ossiannilsson, 1983). Wood Small-reed *C. epigejos* has been reported to be a host in Finland (Söderman, 2007). Söderman (2007) reports the species as inhabiting paludified meadows (where conditions for development of peat exist) and shores where adults and nymphs occur within tufts of small-reed. One annual generation appears to be the rule and overwintering is in the egg stage. At the Inkle Moor site the species was only recorded from one particular pitfall trap at sampling location B where *C. canescens* was recorded as a dominant part of the vegetation. The Thorne Moor discovery suggests it may be more widespread wherever the host plant occurs in abundance.

Nickel (2003) gives detailed information on the fauna occurring on small-reeds (particularly Wood Small-reed *C. epigejos*) in Germany. He lists a total of over forty species of Auchenorrhyncha (from the Delphacidae and Cicadellidae) that are thought to use small-reed species for feeding (as primary or secondary feeding hosts), although further confirmation is still required for some species. In the list *S. okaensis* is not recorded as utilising any other species of small-reed other than *C. canescens*. Although Scandinavian Small-reed has not been specifically sampled for the presence of this species it is rarer and found at higher elevations. *Streptanus okaensis* is essentially a lowland species and is, therefore, clearly monophagous on *C. canescens* in Germany (Nickel, pers. comm.).

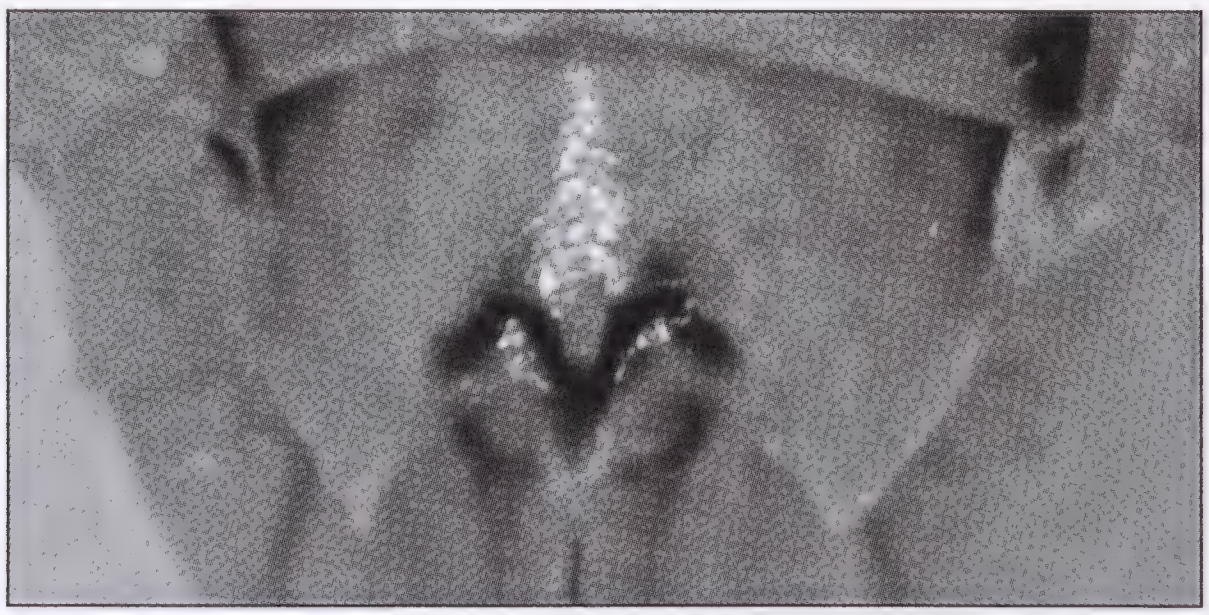


Fig. 4. View of posterior edge of seventh abdominal sternite of female *Streptanus okaensis* from Inkle Moor.

Nast (1972) gives the distribution as Mongolia and Russia (Kuril Islands and central Russia). Ossiannilsson (1983) and della Giustina (1989) report it from North Germany, with the first dating from 1955 by Remane (pers. comm., Dr Herbert Nickel), Denmark, Sweden and Finland extending to central and northern Russia, including Murmansk and the Kola Peninsula (Anufriev, 2000, Dmitriev, 2002) and Siberia (Anufriev & Emeljanov, 1988). Della Giustina (1989) mentions the possibility of the species being present in eastern France. Remane & Fröhlich (1994) add central Spain and Bednarczyk and Gêbicki (1998) add Poland to the distribution. Hamilton (1983) formerly considered *S. okaensis* to be present in the boreal zone of Canada and Alaska but at present has doubts as to the identity of specimens, going so far as to suggest that these may belong to a new or undescribed species not hitherto recorded for North America (pers. comm., Dr Andy Hamilton). Anufrief and Emelyanov (1988) place *S. okaensis* as a synonym of a species described from Sakhalin, *S. ogumae* Matsumura. Investigations are required to further clarify this synonymy.

Discussion

Streptanus okaensis is confirmed as present in Britain. It appears to have been previously overlooked most likely due to a combination of its restriction to a specific host plant (not always easy to sample) and habitat resulting in a localised distribution and, until recently, lack of accessible continental keys and distributional data for Europe that might have alerted us to the possibility of this species being present in the UK. There is also a superficial similarity to the other British *Streptanus* species.

Stands of Purple Small-reed on neighbouring Thorne Moor, where the plant appears to be locally common along many ditches and drains on wet peat, were sampled during 2013. Physical hand searching of litter and sweep-netting were undertaken but these methods did not reveal any specimens of *S. okaensis*. It was only when a vacuum sampler was used that a specimen was found. This method of sampling, along with the pit-fall trapping method employed during the Inkle Moor survey of 2012, are obviously more effective in finding *S. okaensis*.

It is likely that the nature of the fen habitat on Inkle Moor, which is essentially a lagg fen (a term used to describe the wet margins between a raised bog and the surrounding land comprising mineral soils where runoff collects from both the bog

and adjacent land) on the edge of former raised peat bog habitat, and its long continuity are important factors in hosting a population of *S. okaensis*.

The local practice of reclamation of land of poor fertility to improve agricultural productivity (either by the transfer of top-soil from an area of greater fertility known as 'dry warping', or by controlled flooding of local rivers in order to deposit layers of silt, known as 'wet warping') never encroached on this site and this is thought to be a key factor in its ability to support several nationally scarce species of invertebrate including the water beetle *Agabus striolatus* (Gyllenhal) (Anon, 2013) and the ground beetle *Philorhizus sigma* (Rossi) (pers. comm. M. Telfer). The practice of warping occurred mainly in the late eighteenth and early nineteenth centuries but eventually fell out of use by the mid-twentieth century (Gaunt, 1987).

It is also possible that *S. okaensis* will be found to be much more widespread, occurring wherever *C. canescens* occurs in abundance in fen and peat habitats, and has been overlooked either because the most appropriate sampling methods were not adequately employed or simply not used. There is some indication that *S. okaensis* may have a possible preference for stands of the host plant containing a significant amount of litter and this may be a factor contributing to difficulty in detection. Management of *C. canescens*, where it is perceived to be a problem, should avoid un-necessary removal of large amounts of litter so that suitable habitat conditions are maintained for *S. okaensis* and other species of the litter layer. However, there may be special reasons which make the Thorne Moor location of particular significance for *S. okaensis*. The work of Pete Skidmore and others on the fauna (both extinct and living) of Thorne and Hatfield Moors strongly suggest that these moors are western outliers of mire types distributed in Germany, Poland and the Baltic (Eversham, Skidmore & Buckland, 1995). This latest discovery would appear to reinforce this view. Further, it is possible that these moors may well be the only locations for the occurrence of *S. okaensis* in Britain. Further sampling on suitable sites within the geographic range of the host plant, therefore, would need to be undertaken to prove this to be the case.

A small number of other notable species of Auchenorrhyncha was recorded during the 2012 survey including: *Agallia brachyptera* (Boheman), the first Yorkshire record of *Athysanus argentarius* Metcalf, the fourth Yorkshire record of *Paraliburnia adela* (Flor) and the first VC63 (South-west Yorkshire) record of *Streptanus aemulans*.

This discovery now brings the total of British *Streptanus* species to four. Of these it is likely that *S. okaensis* will have the most restricted distribution in the UK. In Germany the Red Data lists of Auchenorrhyncha that have been published include *S. okaensis* with an International Union for the Conservation of Nature designation of Vulnerable (= German Red List status 2). A new German Red Data list is in preparation in which this status is to be reviewed and possible consideration of elevation to Endangered status (Dr Herbert Nickel, pers. comm.).

Future searches for additional locations for *S. okaensis* may also possibly result in the discovery of other overlooked Auchenorrhyncha species. According to Nickel (2003) these could include a small number from the continental mainland (for which small-reeds are primary hosts) such as the delphacids *Criomorphus borealis* (J. Sahlberg), a central and northern European species; *Mirabella albifrons* (Fieber), with a manly central European distribution but also reported from Holland and France; *Xanthodelphax xantha* Vilbaste, from central Europe including Germany, Poland and Belarus, and the cicadellid *Lebradea calamagrostidis* Remane, which is so far reported only from Germany. In addition we also include the deltocephaline *Endria nebulosa* (Ball), a species from Central Europe (Czech Republic, Germany)

and Fennoscandia (not so far known from Norway) to central Russia and the east Palaearctic (also present in the Nearctic region).

As a result of this discovery we also recommend that Auchenorrhyncha collections containing male and female specimens identified as *S. sordidus* should be re-examined in order to gain further information about the status and distribution of *S. okaensis* in Britain.

Acknowledgements

Thanks to Helen Kirk and Ian McDonald of the Thorne and Hatfield Moors Conservation Forum for the opportunity of working on the Inkle Moor samples, providing information on the sampling locations and for facilitating our fieldwork on Thorne Moor during 2013. Thanks also to Dr Alan J. A. Stewart, Organiser of the Auchenorrhyncha Recording Scheme based at the School of Life Sciences of the University of Sussex and to Dr Mike Wilson, Head of Entomology Section of the National Museum of Wales at Cardiff for confirmation of the identification. We are grateful to Bill Dolling and Dr Herbert Nickel for kindly providing comments and advice on drafts of this paper, and the latter in particular for providing additional information on *S. okaensis* including European distribution. Thanks also to Professor George Anufrief for examining the aedeagi of Russian specimens of *S. okaensis* and for details of records from Russia and Poland; Dr Vladimir Gnezdilov at the Zoological Institute, Russian Academy of Sciences for the provision of a copy of the paper by A. A. Zachvatkin containing the original scientific description of *S. okaensis* and permission to include the diagram of the aedeagus in our own paper; Dr K. G. A. Hamilton for his latest opinion on the status of *S. okaensis* in North America; and finally thanks to Val McAtear, Royal Entomological Society Librarian for making copies of relevant papers available.

References

Anon. 2013. *The Inkle Moor Invertebrate Survey – A Synopsis of key findings from the survey as presented at IMIS 2012 Seminar, Monday 23rd September 2013*, 12 pp., Thorne & Hatfield Moors Conservation Forum.

Anufrief, G. A. 2000. About Cicadina-fauna (Homoptera, Cicadinea) of projected national park "Khybyny". In: Readings to memory of Prof. V. V. Stanchinsky. Issue 3: 26–28. Smolensk (in Rusian).

Anufrief, G. A. & Emelyanov, A. F. 1988. In P. A. Lehr (ed.) *Keys to the Insects of the Far East of the USSR* (in six volumes). Volume II: Homoptera and Heteroptera. Academy of Sciences of the USSR, Nauka Publishing House, Leningrad, 1988 [English translation by US Dept. of Agriculture].

Bednarczyk, J. & Gêbicki, C. 1998. Piewiki (Homoptera, Auchenorrhyncha) okolic Janowa Lubelskiego. *Fragmenta Faunistica* **41**: 233–245. Warsaw.

Biedermann, R. & Niedringhaus, R. 2009. *The Plant- and Leafhoppers of Germany – Identification key to all species*. Wissenschaftlich Akademischer Buchvertrieb-Fründ, Scheeßel.

della Giustina, W. 1989. Homoptères Cicadellidae, Volume 3. *Faune de France*. No **73**: 218–9. Fédération Française des Sociétés de Sciences Naturelles, Paris.

Dmitriev, D. A. 2002. Cicadina (Homoptera: Auchenorrhyncha) of the Kola Peninsula basing mainly on the material collected in the Lapland Biosphere Nature Reserve. *Denisia* **4**: 339–348.

Eversham, B. C., Skidmore, P. & Buckland, P. C. 1995. Invertebrates as indicators of lowland bogs in eastern England: some British bugs in a European context. In Harding, P. T, Valovirta, I. & Kime, D. (eds.) *Threatened Species and Bioindicators at the Pan European*

Level. Proceedings of the Ninth International Colloquium of the European Invertebrate Survey. Helsinki, 3–4 September 1993, World Wide Fund for Nature, 36–40.
Gaunt, G. D. 1987. The geology and landscape development of the area around Thorne Moors. In *Thorne Moors Papers* **1**: 6–30.
Hamilton, K. G. A. 1983. Introduced and native leafhoppers common to the old and new worlds (Rhynchota: Homoptera: Cicadellidae). *The Canadian Entomologist* **15**: 473–511.
Le Quesne, W. J. 1969. Hemiptera – Cicadomorpha, Deltocephalinae. *Handbooks for the Identification of British Insects*. Royal Entomological Society of London.
Nast, J. 1972. *Palaearctic Auchenorrhyncha (Homoptera) – An annotated Check List*. Polish Scientific Publishers, Warsaw.
Nickel, H. 2003. *The Leafhoppers and Planthoppers of Germany (Hemiptera: Auchenorrhyncha): Patterns and strategies in a highly diverse group of phytophagous insects*. Pensoft Publishers, Sofia-Moscow / Goecke & Evers, Keltern.
Nickel, H. & Remane, R. 2002. Artenliste der Zikaden Deutchlands, mit Angabe von Nährpflanzen, Nahrungsbreite, Lebenszyklus, Areal und Gefährdung (Hemiptera, Fulgoromorpha et Cicadomorpha). *Beiträge zur Zikadenkunde* **5**: 27–64.
Ossiannilsson, F., 1983. The Auchenorrhyncha (Homoptera) of Fennoscandia and Denmark. *Fauna Entomologica Scandinavica*. Vol. **7** (3): 788–790. Scandinavian Science Press Ltd., Copenhagen.
Remane, R. & Frölich, W. 1994. Beitrage zur Chorologie einiger Zikaden-Arten (Homoptera Auchenorrhyncha) in der Westpalaaktis. *Marburger Entomologische Publikationen* **2**: 131–188.
Söderman, G. 2007. *Taxonomy, distribution, biology and conservation status of Finnish Auchenorrhyncha (Hemiptera: Fulgoromorpha et Cicadomorpha)*. The Finnish Environment **7**: 54 Finnish Environment Institute, Helsinki.
Zachvatkin, A. A. 1948. Novye i maloizvestnye cicadiny iz okskogo zapovednika. *Nauch-no-metodicheskie Zapiski Glavnogo Upravlenya po Zapovednikam* **11**: 186–197.

SHORT COMMUNICATION

An atlas of the Hemiptera-Heteroptera of the British Isles, updated. – I recently advertised in this journal an atlas of the British Hemiptera-Heteroptera, based upon the county records of Massee (1955) (Ryan, 2013). Massee's county distribution has recently been brought up-to-date to include all of the 599 species presently on the British list, and all of the new county records published in the national literature over the last six decades (Ryan, 2014). The atlas has now been brought into line with the new distribution, and the latest version is available for download from the following webpage: *https://sites.google.com/site/BritishHetBugAtlas*. R. P. Ryan, 38 St John Street, Oxford OX1 2LH (email: *RobRyanBugs@gmail.com*).

References

Massee, A. M. 1955. The county distribution of the British Hemiptera-Heteroptera, second edition. *Entomologist's Monthly Magazine* **91**: 7–27.
Ryan, R. P. 2013. An atlas of the British Hemiptera-Heteroptera from the county records of Massee (1955). *British Journal of Entomology and Natural History* **26**: 144.
Ryan, R. P. 2014. The county distribution of the Hemiptera-Heteroptera of the British Isles, fourth edition. *Hemipterist* **1**: 38–103. [*https://sites.google.com/site/TheHemipterist*]

2013 ANNUAL EXHIBITION

Kempton Park Racecourse, Sunbury, Middlesex – 16 November 2013

This year the Society's Annual Exhibition was held upstairs in the Premier Suite at Kempton Racecourse, Sunbury-on-Thames, on the southern outskirts of London. Despite its suburban setting the racecourse is surprisingly easy to reach, either by car or rail and a queue of visitors soon developed during the morning. Exhibitors were allowed in from approximately 10 am onwards to arrange their exhibits and to put up display boards. There was plenty of space and a master plan of where the different orders of insects were grouped could be consulted when entering. Pemberley Books was allocated a stall near the centre so that members had the opportunity to purchase a wide selection of new and secondhand books on entomology and related natural history subjects. Other organisations with stands included Buglife and Butterfly Conservation. The doors were opened to members at 11 am and there was quite a rush with over 170 members and friends attending. The following accounts of exhibits were compiled by the recorders: Aaron Jones (British Butterflies), Sean Clancy (British Macrolepidoptera), Richard Dickson (British Microlepidoptera), Colin Plant (Foreign Lepidoptera), Peter Chandler (Diptera), Roger Booth (Coleoptera), Alan Stewart (Hemiptera), David Baldock (Hymenoptera) and John Badmin (Other Orders and General). The official photographer, Alec Harmer was allocated a separate room to set up his equipment and as a consequence no problems were encountered. David Wilson kindly agreed to process the images for the journal using the latest software techniques. The cost of printing the colour plates in the journal was once again covered by a grant from the Hammond Memorial Fund. The lay-out of the exhibition was master-minded by Rosemary Hill to whom we offer our sincere thanks.

British butterflies

Bailey, K. E. J. – Results of breeding and temperature experiments up to November 2013, in two parts.

(1) *Papilio machaon syriacus* Verity. Examples of adults bred during the winter of 2012/13 in the UK from ova and larvae collected around Kyrenia, North Cyprus in October 2012. When the supply of carrot tops had become desiccated in early December, larvae of the second generation started to feed on the carrots themselves. They further flourished on parsnips, celery sticks, celeriac and fennel roots all from the local Tescos. Turnips (Brassicaceae) were rejected. Fennel roots were preferred and growing fennel was used for oviposition following hand pairing. Also displayed was a photograph of a final instar larva, one of three in the second generation that from L_1 appeared devoid of black pigment, suggesting an albino, the subsequent pupae and adults were however quite normal. It was not possible to breed from the resulting adults.

Colias hyale (L.), typical inbred examples from Serbian stock, July 2012.

Boloria euphrosyne (L.), an aberration from a temperature shocked pupa May 2013, also partial albinos induced by feeding larvae with violets sprayed with dimethyl tyrosine to inhibit melanin formation, May 1979, all ex Gloucestershire stock.

Euphydryas aurinia (Rott.), ab. *virgata* Tutt, a polygenic form from selective breeding, also specimens of ab. *virgata* combined with ab. *atratus* Bailey (Plate 7, Fig. 8). All from stock originating from Devon, May 1980.

Aphantopus hyperantus (L.), a wild caught male showing a possible form of homoeosis on the right hindwing underside together with unusual nervures. The exhibitor believes this may have arisen secondary to injury to the wing bud prior to pupation when it would be hidden beneath the right forewing (which shows no sign of injury), each arising on the third and second thoracic segments respectively. The scale cells have already given rise to the typical eyespot colours but have multiplied randomly during the healing process whilst showing some organization beside an atypical nervure giving a linear effect. Oxfordshire, July 1959.

(2) *Anthocharis cardamines cardamines* (L.), an intersex (Plate 7, Fig. 2).

From a batch of fourteen pupae, a highly unusual female/intersex emerged on 12.v.2013, that was first noticed by its pinkish colour when it flew around the emergence cage. This specimen is a normal female but on the upperside it possesses a narrow orange line along each nervure but only in that part of its length that would occupy the orange patch in a normal male. Each orange line is about 0.5mm wide with the most intense colour exactly over each nervure and fading away to zero progressively away from the nervure on each side of it. The larger black apical area common to females is invaded by continuation of the orange line along several nervures. All the orange lines are bilaterally symmetrical unlike the majority of gynandromorphs, suggesting that if an atypical development factor is involved, it arrives by diffusion along nervures from a central source. The underside is normal. The exhibitor considers this specimen to be an intersexual form and with its known provenance worthy of further discussion.

During the late autumn of 2011 the exhibitor bred a large number of *Colias croceus* (Geoffroy) from a f. *helice* Hübner, female taken in Lot, France, September 2009. Various cold shock regimes were attempted in the hope of obtaining ab. *nigrofasciata* Verity without success, until a new programme was tried. As each pupa formed it was allowed to attain its mature contours. At about two hours whilst still quite soft, green and glossy the suspensory thoracic girdle was cut using fine scissors, the cremastal silk pad was grasped with fine forceps and the pupa removed and transferred to a pin lightly coated with Evostick cement. The pupa, now hanging freely like a nymphalid pupa, was placed with the pin in an open cork lined container and put in a deep freeze for fifteen minutes at $-14°C$, on removal it was immediately placed in the bottom of a household fridge at $+2/+3°C$ for three days. The pupae were then kept at room temperature until eclosion. The experiment resulted in several specimens of ab. *nigrofasciata*. Individuals of *Colias hyale* (L.), treated in the same manner in 2012 produced similar results.

In May 2012 the exhibitor decided to try this regime on *A. cardamines*, a small sample of local wild ova were obtained, giving a limited number of pupae to work with. The intersex specimen shown was the only aberration to emerge.

H. B. Williams (1957) describes an intersex named by Verity as ab. *andromorpha* (probably preceded by ab. *arsenoides* Newnham), together with two from his own collection. They were essentially like females with a powdering of orange scales in the presumptive male area extending into the inner half of the black apical mark. The exhibitor bred a single example of this in May 2007 from a wild female and considers all of these examples purely genetic in origin arising from a balance in expression of male and female characters derived from an equal potency for maleness versus femaleness in the sex chromosomes and autosomes. See also the exhibition notice for M. Callow.

The exhibitor believes that a process similar to that causing the known wing pattern aberrations that appear after temperature shock experiments during the critical period for wing pattern development i.e. the first two days of pupal life, may

have induced his latest intersex specimen. He suggests that wing pattern development may commence under certain conditions prior to actual pupation and may be dependent on the overall rate of development, itself dependent on variations in the environment including photoperiod. These aberrations represent varying degrees of non-differentiation from basic embryonic pattern, unique to every species, yet remarkably similar in allied species.

The exhibitor believes that normal differentiation is dependent on the arrival of a natural hormone-like substance(s) that acts like a catalyst on cellular activity, a chemical signal or 'morphogen'. As normal differentiation proceeds, the final adult pattern is reached via continual change of certain elements in that pattern. Thus every *Limenitis camilla* (L.) starts its pattern evolution as ab. *nigrina* Weymer and through continual change becomes ab. *obliterae* Robson & Gardner, itself a rather variable pattern until the normal wild type pattern is reached. At any stage during this process temperature shock can permanently 'fix' the pattern preventing further differentiation, probably by inducing a toxin or 'anti-morphogen'. The exhibitor has regularly been able to produce various wing pattern non-differentiations identical to those encountered occasionally in nature. He has observed that not all areas of a wing differentiate in synchrony and when a shock is administered after most of the wing has differentiated, those areas only partially differentiated are remarkably constant in position even in different species. He also finds that a given area of wing is sensitive for a certain time and cannot be affected before or afterwards. His conclusion is that one or more anti-morphogens may be secreted into the haemolymph by temperature shock blocking the action of natural morphogen(s) that arise during normal development and access the wings via the nervures. Wigglesworth illustrates these courses in *Ephestia kuehniella* (Zeller). The exhibitor has frequently observed in freshly emerged specimens a narrow crease like structure arising in the centre of each interneuralspace at the outer wing margin, tracking medially and ending exactly at the point of a wing ocellus marking. He considers that this point may be a source of morphogen(s).

M. Yeates (2014) has recently shown that the microinjection of sodium tungstate solution into young pupae induces an identical response to temperature shocks. This inorganic substance appears to mimic the naturally produced, yet hypothetical, anti-morphogen(s) whose actual arrival time post temperature shock cannot be assessed with any accuracy. These experiments can better pinpoint the actual times when non-differentiation has been induced.

The exhibitor concludes that his intersex may be the result of a cold shock induced 'pro male/anti female' morphogen that has accessed the wing via nervures. It might be short lived in this instance and inactive on the wing underside if the cells there were not receptive at this particular time or had already differentiated into normal female tissue under the influence of the DNA and normal morphogen(s). It would have its greatest concentration along each nervure thus inducing the more intense orange colour directly over each nervure.

In May 2001 the exhibitor performed some cold shock experiments on *A. cardamines* and among the results a male ab. *striata* Pionn appeared. On close re-examination this also appears to have some intersexual characters, the bilateral orange patch approximates to a normal male although slightly less intense except along the nervures. In the centre of each interneural space there is an inwardly projecting small patch of black scales arising from the outer margin and extending medially only so far as the black apical wing tip of a normal female and suggesting it to be a remnant of the latter prior to the arrival of a male promoting morphogen via the nervures. The exhibitor considers this may be due to a longer lasting or more

potent male promoting morphogen induced by cold shocks administered to both the pre-pupa and the pupa in this case.

Harmer (2000) suggests that intersexes may arise from high temperature shocks during development and illustrates several examples, reproductions by A. D. A. Russwurm, originally of *Plebejus argus* (L.). Wigglesworth (1953) also refers to intersexes arising post high temperature shocks. He also describes sex reversal secondary to parasitoid invasion and gynandromorph induction in the Hymenoptera secondary to high temperatures. Standfuss (1900–1901) describes the superficial visual transformation of sex related wing colour in *Gonepteryx rhamni* (L.) after high temperature shocks. The exhibitor suggests that the term '*aureoradiata*' may be a useful and descriptive name for this aberration.

References

Harmer, A. S. 2000. *Variation in British Butterflies*. Paphia Publishing Ltd.

Standfuss, M. 1900–1901. Synopsis of experiments in hybridization and temperature made with Lepidoptera up to the end of 1898. *Entomologist* **33**: 1–3.

Wigglesworth, V. B. 1953. *The Principles of Insect Physiology*. Methuen & Co. Ltd. London.

Williams, H. B. 1957. The Variation of *Euchloe cardamines* L. Proc. S. Lond. Ent. Nat. Hist. Soc. **1957**: 82.

Yeates, M. 2013. Exhibit at AES and BENHS annual exhibition, October/November 2013.

BUTLER, A. L. – *Colias croceus* (Geoffroy) ab. *punctellata* Braun. A male upperside, 8.viii.2013, one of two males that emerged from a brood of 20 reared under natural conditions. Amongst its siblings there was a small degree of variation in the size of the discoidal spot of both sexes but all within the normal typical range for the species.

Thecla betulae (L.) ab. nov. a melanic male underside (Plate 7, Fig. 3), this was the most extreme specimen that emerged in a series bred from captive bred stock originating in the Vale of Aylesbury. The young pupae were subjected to a single low temperature shock. The underside has the characteristic hairstreak lines absent and a dark brown ground colour. The upperside ground colour is also much darker than typical and lacking any other colouration. A short series of four males and four females was shown to demonstrate the range of variation that was obtained from the same low temperature shock. All the aberrations emerged in June 2013.

Polyommatus icarus (Rottemburg), ab. *brunnescens* Tutt. + ab. *discreta* Tutt. + ab. *hyacinthus* Stephens, a female underside. This aberration emerged from a batch of butterflies reared from a wild taken female originating near Ardley, Oxfordshire in the spring of 2013. It was the last of the batch to emerge by many days having spent seven days without eating and four days as a pre-pupa before finally pupating undersize. The pupa was not treated and developed naturally. The aberration can be best described under three names; ab. *brunnescens* to describe the very dark background colour, ab. *discreta* to describe the submedian spots being thrown out towards the margin and ab. *hyacinthus* to describe the obsolescence of the basal spots. It emerged 28.viii.2013.

Lysandra bellargus (Rottemburg) ab. nov., a phenocopy of hybrid *polonus*? An interesting exhibit which will probably form a future short paper by the exhibitor. The exhibit comprised eleven aberrant male specimens in total, each showing variation in extent of terminal spotting occurring on the upper side of the wings. This characteristic only occurred in individuals that emerged from pupae subjected to a prolonged cool period. It is believed that this phenotype is dependent on particular

climatic conditions without which only typical specimens result. Where the terminal spotting is well developed on all wings there is a strong resemblance to hybrid *polonus*, a cross between *L. coridon* (Poda.) and *L. bellargus*. One male also had some slight change in ground colour. (Plate 7, Figs 4 & 5).

CALLOW, M. – *Anthocharis cardamines* (L). Two mixed gynandromorphs, both ex ova. The first bred 27.iv.2010, (Plate 7, Fig. 1), corresponds well to the specimens discussed by H. B. Williams and named ab. *andromorpha* Verity. (see K. E. J. Bailey's exhibit note), a predominantly female butterfly with a sprinkling of male orange scales in the area normally occupied by the male apical orange patch, the difference from the descriptions being that it is said to be upperside only where as this specimen had some orange scaling on the underside. The specimen emerged with one normal antenna and one formed as a short club suggesting it may have been exposed to some trauma to the pupa. The second specimen expressed more 'normal' mixed gynandromorph traits of solid male/female patches and dashes. Bred 28.iv.2012.

JENKINS, A. – *Lampides boeticus* (L.), a pair of specimens taken on the Kent coast, 23.ix.2013 and 8.x.2013.

JONES, A. M. – *Anthocharis cardamines* (L). Two mixed gynandromorphs from widely separated Surrey localities, both bred from wild ova/larvae taken from roadside verges prior to cutting. Emerged 2.v.2013 and 7.v.2013.

Apatura iris (L). ab. nov. (Plate 7, Fig. 6), A male aberration bred 10.vii.2013 from Surrey stock. This shows an increase in the size of the white markings, with some becoming streaked and suffused on both upper and underside, the purple also appearing much darker and less apparent than usual. It emerged in a large brood raised under natural conditions, all sibling butterflies were type, its cause unknown.

Major variation in *A. iris* wings is normally confined to the loss to a greater or lesser extent of the white markings, as in the well known range; *iole* Schiffermuller, *lugenda* Cabeau, *iolata* Cabeau etc. The only aberration that is named with an increase in markings is ab. *thaumantis* Schultz the description being; "The pattern of the white spots is intensified on the upperside. The band of the hindwings is broader and the light spots on the inner-margin of the forewings and the margin of the hindwings are strikingly larger, the latter, in the male, clearer and larger than in the type." The exhibitor has been unable to find an illustration of the specimen described by Schultz and although the exhibited specimen had some of the characteristics outlined in the description no mention is made of the streaking or suffusing of the white markings and it would appear that this is a new unnamed aberration.

KOLAJ, A. – *Lampides boeticus* (L.), specimens bred from ova taken on the Kent coast during August 2013. The immigration and breeding of *L. boeticus* on Kent and Sussex coast during 2013 has been well documented on the internet with many fine photographs being taken and notes on behaviour being made.

PARKER, M. – *Lasiommata megera* (L.), ab. *pallida* Gillmer, a male specimen taken on chalk downland in the Weymouth area, Dorset. 13.viii.2013 (Plate 7, Fig. 10).

PARKER, R. – An update on the population of *Plebejus argus* (L.) translocated to Blaxhall Common, Suffolk in 2008. The re-establishment attempt involved the translocation of 60 adult *P.argus* to Blaxhall Common SSSI. The colony has now survived and flourished over a period of six years. Items in the updated display included the outcomes of the single species transect established to monitor the colony, the five year report to JCCBI, the details of the original translocation in a special addition of "Suffolk Argus" and an article from last autumn's "Antenna", part of a special feature on Insect Translocations in the UK.

The monitoring study showed progressively increasing numbers along the transect, rising from the original release of 60 in 2007 to 160 in 2013, an annual index rising to

476 and a flight period stretching from five weeks to nine weeks by 2011, but reduced to six weeks in the hot summer of 2013.

Over the same period the flight area has extended materially as fresh heather habitat has been created. All in all, the colony appears to be in a very healthy state six years after the initial translocation though its future is dependent on continuing habitat management by committed teamwork.

ROUSE, T. – *Vanessa atalanta* (L.), a specimen approaching ab. *flavescens* Fritsch, taken in the exhibitor's garden at Densole, Kent, 21.ix.2013 (Plate 7, Fig. 9).

YEATES, M. A. – Results of a series of breeding experiments during 2013 on chemically induced aberrations. *Aglais urticae* (L.) in two broods; fresh pupae micro-injected with 0.2l of a 1M solution of sodium tungstate, showing transitional development of wing patterns producing variation similar to that shown in cold shocks. The two broods showed different responses, one showing very much more extreme variation than the other, indicating that some genetic factors may apply. The aberration ab. *pseudoconnexa* Cabeau, turned up in one of the broods at 25% of treated and untreated individuals and is thought to be genetic in origin. The aberrations that occurred included ab. *semiichnusoides* Pronin, ab. *leodiensis* Cabeau, ab. *nigra* Tutt, ab. *nigrita* Fickert and one extreme specimen combining ab. *nigrita* with ab. *pseudoconnexa* (Plate 7, Fig. 7).

Polygonia c-album (L.), *Aglais io* (L.) and *Aglais urticae* (L.), fresh pupae of various ages micro-injected with 0.2l 1M sodium tungstate. The results showed that early injection does not ensure variation, which suggests that the injected solution must be either metabolised or removed quickly, or, variation results from injection being concurrent with a key part of the pattern making process.

P. c-album pupae were treated in hourly steps from 2–8 hours, *ab. obscura* Closs appeared at 3 hours (intermediates at 2 hours) and another *obscura* type form at 7–8 hours, referable to as ab. *sagitta-album* Frohawk, this was the only specimen with the underside 'c' turned to a pear shape. Several similar upperside specimens retained the normal 'c' with one referrable to ab. *o-album* Tutt. No specimens with confluent forewing markings were noted before 8 hours.

A. io pupae were treated from 3–11 hours post pupation. Only ab. *semi-ocellata* Frohawk turned up at 9 hours and it is believed that timings for any aberrations may be critical and abrupt. Examples of ab. *belisaria* Oberthur appeared at a rate of 1 in 15 at 6–12 hours, but these did not have sufficient timing accuracy to be included in the main results.

A. urticae pupae were treated from 7–12 hours, a more gradual and progressive effect was observed in this species with modification observable from 7–12 hours, ab. *semiichnusoides* was formed by 11 hours and a form transitional to ab. *nigrita* at 12 hours.

BRITISH MACROLEPIDOPTERA

BANTHORPE, M. G. – From Lower Stondon, Beds. (VC30), a striking, asymmetrical aberration of *Spilosoma luteum* (Hufn.) light-trapped at the above location on 3.vii.2013 (Plate 8, Fig. 7).

BROWN, D. C. G. – From Dunwich, Suffolk (VC25), an example of *Chrysodeixis chalcites* (Esper) taken on 1.x.2013. From the Lizard, Cornwall (VC1), an example of *Ochropleura leucogaster* (Freyer) recorded on 30.x.2013. Also shown was a beautifully-marked, probably unique, heavily suffused example of *Miltochrista miniata* (Forst.), Maentwrog, Gwynedd, 23.vii.2013 which was undoubtedly the 'star of the show' (Plate 8, Fig. 6).

BUTCHER, A. G. J. – Just two specimens shown: *Catocala fraxini* (L.) a bred example from Hamstreet, Kent (VC15) exhibiting atypical underside markings; and a richly-coloured example of the scarce immigrant *Eublemma purpurina* (D. & S.) taken at Grain, Kent (VC16) on 25.vi.2013.

CLARKE, J. H. – A varied selection of interesting forms and immigrants taken in southern England during 2013. These featured a bred example of *Scopula nigropunctata* (Hufn.) from a female taken at Greatstone, Kent (VC15) on 24.vii.2013; *Acherontia atropos* (L.) from Porthcurnow, Cornwall (VC1) on 18.x.2013; *Dryobotodes tenebrosa* (Esper), the second VC10 record from Bonchurch, Isle of Wight on 27.ix.2013; *Dicycla oo* (L.) from Crawley Down, West Sussex (VC13) on 16.vii.2013; and *Amphipoea lucens* (Freyer) from Plymstock, Devon (VC3) on 25.viii.2013. Also shown was a striking, banded form of *Entephria flavicinctata* (Hübn.) bred from a female taken at Grassington, Yorkshire in 2012 (Plate 8, Fig.1).

A second selection of specimens showed Shetland forms and races of a number of species collected during 2013, usefully exhibited alongside typical southern examples for comparison. Species exhibited thus were *Hepialus humuli* (L.), *Hepialus fusconebulosa* (De Geer), *Xanthorhoe fluctuata* (L.), *Xanthorhoe montanata* (D. & S.), *Blepharita adusta* (Esper), and *Hadena confusa* (Hufn.).

DEANS, M. J. – A selection of interesting immigrant species recorded during 2013 from Bawdsey, Suffolk (VC25) that included the first VC record of *Spargania luctuata* (D. & S.), 21.viii.; *Lymantria dispar* (L.) on 5.ix.; *Utetheisa pulchella* (L.) on 3.x.; the third county record of *Myththimna loreyi* (Dup.), 8.x.; and two examples of *Eublemma purpurina* (D. & S.) taken on 17.vii. & 5.ix. An example of *Eublemma parva* (Hübn.) was also shown that had been taken by P. E. Bryant at Woolpit, Suffolk (VC26) on 20.vi.2013, constituting the first record for VC25.

DICKSON, R. J. – A specimen of *Cyclophora ruficiliaria* (H.-S.) taken at Stubbington, Hampshire (VC11) on 23.viii.2013 by D. Houghton.

HALL, N. M. – A varied exhibit of moths that included specimens exemplifying identification problems between the species pairs *Xanthorhoe spadicearia* (D. & S.)/*X. ferrugata* (Clerck), *Epirrhoe rivata* (Hübn.)/*E. alternata* (Müll.), *Pennithera firmata* (Hübn.)/*Thera (P.) obeliscata* (Hübn.), *Mythimna pallens* (L.)/*M. favicolor* (Barrett), and *Amphipoea fucosa* (Freyer)/*A. oculea* (L.). Species of note included specimens of *Rhodometra sacraria* (L.) from Earley, Berkshire (VC22) on 27.x.2013; *Xanthorhoe biriviata* (Borkh.) from Hastings Country Park, Sussex (VC14) on 24.vii.2013; *Lithosia quadra* (L.) from Bowdown Woods, Berkshire (VC22) on 3.x.2013; *Noctua janthina* (D. & S.) from North's Seat, Hastings, Sussex (VC14) on 25.vii.2013; and *Diachrysia chryson* (Esper) from Thatcham Marsh, Berkshire (VC22) on 18.vii.2013.

HALSEY, J. – A number of interesting species and forms taken in the exhibitor's garden at Bonchurch, Isle of Wight (VC10) during 2013. These included the first VC record of *Pechipogo plumigeralis* (Hübn.) on 30.viii.2013 (a second was recorded a few days later), and interesting forms of *Epirrhoe alternata* (Müller), *Cabera exanthemata* (Scop.), *Miltochrista miniata* (Forster), and *Nycteola revayana* (Scop.). Also shown was a strikingly marked aberration of *Perizoma flavofasciata* (Thunb.) taken at Mottistone (VC10) on 31.v.2013 (Plate 8, Fig. 4).

HARMAN, T. W. – A fascinating exhibit that included a wonderful selection of exciting aberrations taken by several recorders, many of these historic and dating back as far as 1929. Several more contemporary specimens were also shown, the most interesting of these was a possibly uniquely marked example of *Rheumaptera undulata* (L.) taken by P. Cleary-Pugh at Blackrod, Lancs. on 13.vi.2009 (Plate 8, Fig. 3).

HART, C. – An exhibit that included the second Kent example of *Idaea degeneraria* (Hübn.) from Dungeness (VC15) on 25.ix.2013 and an interesting semi-melanic form of *Venusia cambrica* (Curt.) taken near Inverness (VC96) on 14.vii.2013 (Plate 8, Fig. 5). Attention was also drawn to the two colour morphs of *Scopula imitaria* (Hübn.) as shown by a short, bred series of specimens.

HAYWARD, R. – A number of specimens of interest from several localities, mainly involving minor forms and aberrations, and immigrants. The most significant of these were examples of *Cyclophora puppillaria* (Hübn.) from Wokingham Without, Berkshire (VC22) on 25.x.2013, a rare form of *Ecliptoptera silaceata* (D. & S.) from Maidenhead, Berkshire (VC22) on 3.viii.2013 (captor: M. Woolner, Plate 8, Fig. 2), *Hyles gallii* (Rott.) from Meopham, Kent (VC16) on 23.viii.2013, and *Utetheisa pulchella* (L.) from West Bexington, Dorset (VC9) on 9.ix.2013. A separate exhibit showed the difficulties in separating *Eilema complana* (L.), *E. lurideola* (Zincken), and *E. caniola* (Hübn.), including a specimen that appeared to show an overlap in distinguishing characters.

JENKINS, A. – Examples of minor variations in *Colotois pennaria* (L.) and *Lymantria monacha* (L.) were shown, alongside specimens of *Catocala fraxini* (L.) bred from a female caught at Durlston, Dorset (VC9) in 2012.

KNILL-JONES, S. A. – A selection of interesting species and forms taken in the exhibitor's garden at Totland, Isle of Wight during 2013 that included the third VC record of *Dryobotodes tenebrosa* (Esper) on 29.ix. (see also J.H. Clarke exhibit), and the first VC record of *Autographa bractea* (D. & S.), taken on 18.vii. and likely to relate to an immigrant.

KOLAJ, A. – A varied exhibit that included *Catocala fraxini* (L.) from Hamstreet, Kent (VC15) in 2013, wild-caught and bred examples of *Pechipogo plumigeralis* (Hübn.) from New Romney, Kent (VC15) in 2012, and *Dendrolimus pini* (L.) from near Inverness (VC96) in 2013. Varieties shown included melanic forms of *Peribatodes rhomboidaria* (D. & S.) and *Omphaloscelis lunosa* (Haworth) from the Coventry area (VC38) in 2013, and an example of *Ptilodon capucina* (L.) taken near Inverness (VC96) on 25.vi.2013 showing a symmetrical scale deficiency.

LANGMAID, J. R. – A striking, dark aberration of *Cyclophora puppillaria* (Hübn.) taken at Bracklesham Bay, Sussex (VC13) on 23.ix.2013 and exhibited on behalf of the captor D. Lee. Also a leucistic *Noctua comes* (Hübn.) taken at Southsea, Hants. (VC11) on 28.viii.2013. Unfortunately this exhibit was missed by the recorder as the *C. puppillaria* specimen (which the recorder was familiar with) would otherwise have been chosen for photography. A request has been made to the exhibitor to re-exhibit this specimen in 2014 so this exceptional aberration can be photographed.

MASTERS, I. D. – From Middleton-on-sea, Sussex (VC13), a number of interesting resident and immigrant species that included examples of *Agrius convolvuli* (L.), *Lithosia quadra* (L.), and *Eilema caniola* (Hübn.) from 2013, and specimens of *Xanthorhoe biriviata* (Borkh.) from 30.vii.2010, and *Noctua janthina* (D. & S.) from 24.vii.2010.

MCCORMICK, R. F. – Records of interest from Devon (VC3/VC4) during 2013 sourced from various recorders, the specimens shown not necessarily being those recorded during the 2013 season. These included five records each of the immigrants *Cyclophora puppillaria* (Hübn.) and *Agrius convolvuli* (L.), the latter including a single larval record; *Utetheisa pulchella* (L.) records from Budleigh Salterton on 5.x., Ipplepen on 6.x., and Bere Alston on 7.x.; the first VC4 record of *Mythimna obsoleta* (Hübn.) from Chivenor on 18.vi.; and *Catocala fraxini* (L.) from Totnes on 3.x. Also shown were four species recorded during a trip to Durlston, Dorset (VC9) on 8.x.2013 that included examples of *Trigonophora flammea* (Esper) and *Dryobotodes tenebrosa* (Esper).

PLATE 5. Fig. 1. English oak apical twigs covered in pit galls induced by *Asterodiaspis* spp. Fig. 2. A group of post-reproductive adult female *Asterodiaspis variolosa* on oak; up to 48 scales were observed per 2 cm length of apical twig. Fig. 3. *Asterodiaspis quercicola* over-wintering adult female in a pit gall on oak. Fig. 4. *Parthenolecanium rufulum* over-wintering second-instar nymphs on oak. Fig. 5. *Parthenolecanium rufulum* post-reproductive adult females on oak. Fig. 6. *Diaspidiotus zonatus* over-wintering adult female scale covers.

PLATE 6. Fig. 1. Hawthorn shieldbug *Acanthosoma haemorrhoidale*, Scotland, 2014. Photo: Alex Ramsay. Fig. 2. Male *Streptanus okaensis* from the western margin of Thorne Moor on 1.x.2013 (after dissection) showing the colour characteristics of a late season specimen. Photo Stuart Foster. Fig. 3. *Ledra aurita* adult with green algal growth on body, Perry Woods, Kent, 1990. Photo: John Badmin. Fig. 4. Male velvet ant *Mutilla europaea*, Faversham Creek, Kent, 2013. Photo: Peter Maton.

PLATE 7. Fig. 1. *Anthocharis cardamines* gynandromorph, bred ex ovum, 27.iv.2010, M. Callow. Fig. 2. *Anthocharis cardamines* intersex, cold shock treatment, 12.v.2013, K. E. J. Bailey. Fig. 3: *Thecla betulae*, cold shock treatment, A. Butler. Figs. 4 & 5. *Lysandra bellargus*, spring brood, cold period treatment, A. Butler. Fig. 6. *Apatura iris* ab. nov, bred ex Surrey stock, 10.vii.2013, A. M. Jones. Fig. 7. *Aglais urticae*, injected with 0.2µl of sodium tungstate at 6–12 hours of pupating, M. A. Yeats. Fig. 8. *Euphrodryas aurina* ab. *virgata* Tutt combined with ab. *atratus* Bailey, bred ex. Devon stock, K. E. J. Bailey. Fig. 9. *Vanessa atalanta* approaching ab. *flavescens* Fritsch, Densole, Kent, 21.ix.2013, T. Rouse. Fig. 10. *Lasiommata megera* ab. *pallida* Gillmer, Weymouth, Dorset, 13.viii.2013, M. Parker.

PLATE 8. Fig. 1. *Entephria flavicinctata*, banded aberration, Grassington, York, J. H. Clarke. Fig. 2. *Ecliptopera silaceata*, Maidenhead, Berks., captured by M. Woolner, 3.viii.2013, exhibited by R. Hayward. Fig. 3. *Rheumaptera undulata*, Blackrod, Lancs., 13.vi.2009, P. Cleary-Pugh, exhibited by T. W. Harman. Fig. 4. *Perizoma flavofasciata*, banded aberration, Mottistone, Isle of Wight, 31.v.2013, J. Halsey. Fig. 5. *Venusia cambrica*, partial melanic, Inverness, Scotland, 14.vii.2013, C. Hart. Fig. 6. *Miltochrista miniata*, suffused aberration, Maentwrog, Gwynedd, Wales. 23.vii.2013. D. C. G. Brown. Fig. 7. *Spilosoma luteum*, Lower Stondon, Beds., 3.vii.2013, M. Banthorpe. Fig. 8. *Polymixis* (*Bischoffia*) *bischoffi*, Greece, Rhodes, Kalathos, near Lindos, 20.x.2013, A. J. Pickles. Fig. 9. *Syncopacma vinella*, Isle of Wight, bred from *Genista tinctoria*, July 2013, S. D. Beavan. Figs. 10 & 11. *Musotima nitidalis*, newly established species for UK, Crawley Down, West Sussex, October/November 2013. J. Clarke. Fig. 12. *Stenoptilia islandicus*, Lochan na Lairige, Mid-Perthshire, Scotland, 18.vii.2013, (only second known extant population in British Isles), R. J. Heckford.

OWEN, J. E. – Some macromoth species that were new to the exhibitor's garden near Dymchurch, Kent (VC15) in 2013 were shown, bringing the total number of macromoths recorded from this long-standing recording site to an excellent 532 species. These included immigrant examples of *Scopula rubiginata* (Hufn.) on 23.viii. and *Acronicta strigosa* (D. & S.) on 14.vii., the latter the first modern county record of this extinct former resident.

REID, I. – An exhibit showing variation within an inland colony of *Scopula marginepunctata* (Goeze) established in Rugby (VC38), that included coastal specimens from VC1 for comparison.

SIMS, I. – An exhibit that showed a number of species of interest recorded in Berkshire (VC22), the most notable of these being *Rhodometra sacraria* (L.) from Jealott's Hill on 8.x.2013; *Orthonama obstipata* (F.) from Pangbourne on 8.viii.2013; *Catarhoe rubidata* (D. & S.) from Pangbourne on 8.vii.2013; and *Thera cupressata* (Geyer) from Lower Earley on 27.vi.2012.

TRASENSTER, M. – A single moth exhibit featuring a strongly demarcated bilateral gynandromorph of *Noctua pronuba* (L.) from Tredomen, Ystrad Mynach, Glamorgan (VC41) on 18.viii.2012.

WHEELER, K. J. – An exhibit on the recent colonist *Dryobota labecula* (Esper), stating it to be established in the Fareham area, Hampshire (VC11) and describing aspects of its life history indicated by the captive rearing of the species.

WILSON, D. – An exhibit showing some recently established resident species, variations, and immigrants recorded from the exhibitor's garden at Blythburgh, Suffolk (VC25). Of particular note were several varieties of *Hylaea fasciaria* (L.) taken in 2013 (with a comment that the green ab. *prasinaria* is more frequent at the site than the type form); two worn specimens of *Comibaena bajularia* (D. & S.) that may have been referable to as ab. *rosea*, taken on 20. & 22.vii.2013; three examples of *Euxoa cursoria* (Hufn.) recorded in late August 2013 that were probably wanderers from coastal colonies in the area; and two *Chrysodeixis chalcites* (Esper), including one taken on 30.ix.2013.

BRITISH MICROLEPIDOPTERA

BEAVAN, Miss S. D. & HECKFORD, R. J. – *Parornix alpicola* (Wocke), near Loch Borralie, West Sutherland NC3967 (VC108) larva mining leaf of *Dryas octopetala* 20.vii.2013, moth reared 16.ix.2013. Apparently new British locality and possibly only the third. *Biselachista eleochariella* Stainton, Duartmore Burn, West Sutherland NC178370 (VC108) larvae mining leaf of *Carex panicea* and another *Carex*, possibly *C. nigra*, 8.v.2013, moths reared 5 & 15.vi.2013 (genitalia determination). *Coleophora linosyridella* Fuchs, Berry Head area, Brixham, Devon (VC3) larval case on *Aster linosyris* (Goldilocks Aster) 22.v.2013, moth (♀) reared 8.vii.2013 and adult (♂) collected 29.vi.2013 (genitalia determination of both). New to VC3; the first British record outside Kent and Essex and a previously unrecorded British foodplant. *Agonopterix atomella* (D. & S.), Isle of Wight (VC10) larvae in spun leaves of *Genista tinctoria* 21 & 23.vi.2013, moths reared 17 & 22.vii.2013, respectively. Apparently first VC10 record since 1969. *Chionodes distinctella* (Zeller), Findhorn, near Forres, Moray NJ049645 (VC95) larvae in sand-covered silken tubes attached to the moss *Syntrichia ruralis* ssp. *ruraliformis* but feeding on leaves of *Lotus corniculatus*, 12.v.2013, moths reared 2 & 4.vii.2013. Larva previously unknown in the British Isles and *Lotus corniculatus* is not one of the foodplants given in mainland European literature. *Scrobipalpa clintoni* (Povoln), First Coast, Wester Ross NG921910 (VC105) pupae in stems of *Rumex obtusifolius* 7.v.2013, moths reared 20.v.2013.

Previously unrecorded foodplant. *Syncopacma vinella* (Bankes), Isle of Wight (VC10) larvae in spun leaves of *Genista tinctoria* 23.vi.2013, moths reared 13 & 16.vii.2013 (genitalia determination) (Plate 8, Fig. 9). New to VC10. Previously only known from four or five localities in Sussex, not seen at its last known locality there since 1990 and until now believed to be extinct in the British Isles. *Gynnidomorpha permixtana* (D. & S.), Oldshoremore, West Sutherland NC2058 (VC108) 19.vii.2013 (genitalia determination). New to VC108 and apparently the most northerly Scottish locality. *Stenoptilia islandicus* (Staudinger), east of Lochan na Lairige, part of one of the lower slopes of Ben Lawers, Mid Perthshire NN6040 (VC88) 18.vii.2013 (Plate 8, Fig. 12). New locality and only the second known extant locality in the British Isles, the other being 1½ km to the west on Meall nan Tarmachan.

CLARKE, J. – *Catoptria verellus* (Zincken) 2 individuals, Romney Marsh, Kent, late vii.2013 (with *C. falsella* (D. & S.), for comparison); *Musotima nitidalis* (Walker) 3 individuals, Crawley Down TQ3538, West Sussex (VC13), 31.x.2013, 2.xi.2013 and 9.xi.2013 (Plate 8, Figs. 10 & 11); *Agriphila geniculea* (Haworth), Kent, vii.2013, melanic; *Mecyna flavalis* Caradja, Hayling Island SZ6999 approx., S. Hants. (VC11), 14.v.2013, MV; *Crambus pascuella* (L.), Crawley Down TQ3538, West Sussex (VC13), melanic and typical examples.

DEANS, M. J. – *Caloptilia hemidactylella* (D. & S.), Bawdsey Hall TM347394, East Suffolk (VC25), 16.viii.2013 (also seen 10.viii.2013); *Tuta absoluta* (Meyrick), Tomato Leaf-miner, Bawdsey Hall TM347394, East Suffolk (VC25), 5.x.2013 leg. M. J. Deans, new to Suffolk; *Anarsia lineatella* Zeller, Bawdsey Picnic Site, TM332381, 1.viii.2013, MV (also seen on 26.vii.), leg. S.Whitehouse, new to Suffolk; *Clavigesta sylvestrana* (Curtis), Bawdsey Picnic Site, TM332381, 26.vii.2013, MV, first Suffolk record since 1948; *Agrotera nemoralis* (Scopoli), Bawdsey Hall TM347394, East Suffolk (VC25), 21.vi.2013, MV, new to Suffolk.

DICKSON, R. J. – *Agonopterix bipunctosa* (Curtis), Botley Wood, SU5309, S. Hampshire (VC11), 19.vii.2013, MV, leg. Maurice Opie; *Oegoconia quadripuncta* (Haworth), Alverton Hotel, Truro, SW831451, E. Cornwall (VC 2) 11.ix.2013 indoors (fasciae darker and less defined than usual); *Bactra lacteana* Caradja, Funtley SU565081, S. Hampshire (VC11), 29.viii.2013, MV, leg. Maurice Opie, gen. det. R.J. Dickson; Stubbington SU5503, S. Hampshire (VC11), 18.vi.2013, MV. leg. Dan Houghton, gen. det. R.J. Dickson; *Agonopterix astrantiae* (Heinemann) ♀, Hen Wood nr West Meon, SU6522, S. Hampshire (VC11), 23.viii.2013, MV; *Carpatolechia decorella* (Haworth) ♀, Botley Wood, SU5410, S. Hampshire (VC11), 16.iv.2013, MV, leg. Maurice Opie; *Udea fulvalis* (Hübn.) Stubbington SU5503, S. Hampshire (VC11), 8.viii.2013, MV, leg. Barry Duffin; *Eulamprotes immaculatella* Douglas, Horsea Island, SU6303, S. Hampshire (VC11), 20.ix.2013, MV.

ELLIOTT, B. – *Agonopterix capreolella* (Zeller), two photographs showing radical leaves of *Pimpinella saxifraga* L., burnet saxifrage, which had been raised up from basal level of herbage to show mature spinnings of this species, from Burren, Co. Clare (VCH9), also a few moths bred from The Burren and this foodplant; *Cydalmia perspectalis* (Walker), Chandler's Ford, SU418213, S. Hants (VC11), one of two examples seen in his garden this autumn; *Olethreutes aurofasciana* (Haworth), Ventnor SZ5577 Isle of Wight (VC10), 22.viii.2013 (five specimens); *Clepsis rurinana* (L.), The Burren, Co.Clare, 5–12.vii.2013; *Aethes hartmanniana* (Clerck), Portsdown Hill SU60, S. Hants (VC11), 20-25.v.2013; *Notocelia tetragonana* (Stephens), Shieldaig NG814538, Wester Ross (VC105), 16.v.2012, mature larvae seen in numbers.

EVANS, D. – *Musotima nitidalis* (Walker), Hurn Forest SU1001, Dorset (S.Hants VC11), 5.x.2013, two to a 6 watt Heath trap.

HALL, N. M. – *Calybites phasianipennella* (Hübn.) f. *quadruplella* (Zeller), North's Seat, TQ8511, East Sussex (VC13), 23.vii.2013; *Archips oporana* (L.), Sandford SY9289, Dorset (VC9) 18.vii.2002; *Adoxophyes orana* (Fischer v. Röslerstamm), Hastings Counry Park TQ8511, East Sussex (VC14), 27.viii.2013; *Evergestis limbata* (L.), Hastings Country Park TQ8511, East Sussex (VC14) 24.vii.2013; *Anania perlucidalis* (Hübn.), Snelsmore Common SU4670, Berkshire (VC22), 13.vii.2013 and Harcourt Drive, Earley, Berkshire (VC22), 14.vi.2004; *Mecyna flavalis* (D. & S.), Thatcham Marsh, SU4871 approx., Berks (VC22), 18.vii.2013; *Acrobasis tumidana* (D. & S.), Hastings Counry Park TQ8511, East Sussex (VC14), 22.viii.2013 and 27.viii.2013.

HALSEY, J. – *Cydalima perspectalis* Walker, Bonchurch SZ5777, Isle of Wight (VC10), 28.vii.2013, new to Isle of Wight and possibly the first melanic for the British Isles.

JENKINS, A. – *Uresiphita gilvata* (F.), Durlston, SZ0377, Dorset (VC9), 5.x.2013, taken at MV light.

KNILL-JONES, S. – Moths from Totland SZ329859, Isle of Wight (VC10): *Catoptria falsella* (D. & S.), 7.vii.2013; *Ostrinia nubilalis* (Hübn.), 30.vi.2013; *Calamotropha paludella* (Hübn.), 21.vii.2013; *Dolicharthria punctalis* (D. & S.), ♀, 21.vii.2013; *Agonopterix yeatiana* (F.), 3.vii.2013; *Acleris sparsana* (D. & S.), 8.x.2013; *Cryptoblabes bistriga* (Haworth), 16.viii.2013; *Pyrausta purpuralis* (L.), 23.vii.2013; *Pyla fusca* (Haworth), 15.vii.2013; *Agriphila geniculea* (Haworth), 9.viii.2013; *Eudonia angustea* (Curtis), 6.x.2013; *Acleris hastiana* (L.), 7.i.2013; *Ypsolopha vitella* (L.), 30.ix.2013; *Y. sequella* (Clerck), 7.x.2013.

KOLAJ, A. J. – *Uresiphita gilvata* (F.) and *Antigastra catalaunalis* (Duponchel), Swanage SZ0278, Dorset (VC9), 4.x.2013.

LANGMAID, J. R. – *Bryotropha basaltinella* (Zeller), Southsea, SZ6598, S. Hants (VC11), 15.viii.2013, new to Hampshire; *Anatrachyntis badia* (Hodges), Southsea, SZ6598, S. Hants (VC11), 22.vii.2013, garden MV trap, new to Hampshire and possibly the first specimen to be taken in the wild in Britain; *Blastobasis vittata* (Wollaston), two specimens to illustrate the variation in this species, Southsea, SZ6598, S. Hants (VC11), 1.viii.2013, Portsmouth SU676003, S. Hants (VC11), 15.viii.2013, leg. I. R. Thirlwell; *Uresiphita gilvata* (F.), Southsea, SZ6598, S. Hants (VC11), 3.x.2013, one of several of this migrant species recorded in Hampshire this year; *Apomyelois ceratoniae* (Zeller), Southsea, SZ6598, S. Hants (VC11), 6.vii.2013, MV light, a fruit & nut pest which is rarely caught "in the wild".

MASTERS, I. – Records from Middleton-on-Sea, SU982004, West Sussex (VC13): *Melissoblaptes zelleri* (Joannis), 22.vii.2013, MV. The exhibitor observed that the specimen dated 27.vii.2012 and exhibited last year (*BJENH* **26**: 34) was confirmed by Colin Pratt as new to West Sussex; *Ethmia quadrillella* (Goeze), 27.viii.2013, MV; *Marasmarcha lunaedactyla* (Haworth), 12.vii.2013, MV (also recorded on 14.vii. & 15.vii.2013); *Dolicharthria punctalis* (D. & S.), 4.viii.1996, actinic trap, leg. R. J. Brooker and 29.vii.2011, MV; *Palpita vitrealis* (Rossi), 4.viii. & 5.ix.2013, MV (also recorded on 7.viii., 2.x., 4.x., & 7.x.2013).

MCCORMICK, R. F. – Specimens illustrating the following significant Devon records: *Euchromius ocellea* (Haworth), Abbotskerswell SX8668, S. Devon (VC3), 4.i.2013, leg. Barry Henwood; *Oncocera semirubella* (Scopoli), Teignmouth SX9373, S. Devon (VC3), 2.x.2013, a late date and darkly coloured, possibly a migrant. Moths from outside Devon: *Catoptria furcatellus* (Zetterstedt), a mountain near Dalwhinnie, v. approx NN68, East Inverness-shire (VC96), 10.vii.2013; *Udea fulvalis* (Hübn.), Ferndown SU0800, Dorset (VC9), 11.viii.2013, leg. R. Cook.

OWEN, J. – All specimens from the garden at Eastbridge House near Dymchurch, TR076319, E. Kent (VC19): *Delplanqueia dilutella* (D. & S.), 25.viii.2013; *Mecyna*

flavalis (D. & S.) 8.viii.2013; *Catoptria verellus* (Zincken), 26.vii.2013; *Acleris lorquiniana* (Duponchel) 19.x.2012, new to Kent; *Ypsolopha vittella* (L.), 14.viii.2013; *Coleophora lixella* Zeller, 20.vii.2013; *Stenoptilia pterodactyla* (L.), 29.vii.2013.

SIMS, I. – *Yponomeuta evonymella* (L.), Beale Park SU6178, Berkshire (VC22), 14.vi.2013, larvae on bird cherry, *Prunus padus* L., first record of larvae for Berkshire; *Y. rorrella* (Hübn.) (Willow Ermine), Jealott's Hill SU8673, Berkshire (VC22), 9.viii.2013, Rothamsted trap; *Y. plumbella* (D. & S.), Beale Park SU6178, Berkshire (VC22), 20.vii. & 8.viii.2013, Rothamsted trap; *Agriphila latistria* (Haworth), Lower Earley SU7570, Berkshire (VC22), 15.viii.2013, 6 watt Heath trap.

WATTS, C. – *Cydalima perspectalis* (Walker), Islington TQ313848 , Middlesex (VC21), bred from pupae found on newly-planted box, *Buxus sempervirens* (L.) which had been almost completely defoliated by over 100 larvae (photograph exhibited) and around 20 bright green pupae found among the leaf litter at the base of the plants. Unfortunately the cat showed interest, but little curatorial aptitude.

WHEELER, P. R. – *Coleophora fuscocuprella* (H.-S.), Chobham Common SU9764, Surrey (VC17), specimens, photographs, and comments on its ecology on the site, and breeding it in captivity. There appeared to be a lag of years after regenerating birch appeared before the moth colonised it. When it did so, numbers built up and the signs of larval feeding became manifest. Also exhibited two *Neofriseria* sp. from Kempton NR, TQ1270, Middlesex (VC21) – which of the two known British species they represent awaits dissection of the genitalia.

WILSON, D. – *Evergestis limbata* (L.), Blythburgh TM4575, East Suffolk (VC25), 4.vii. & 28.vii.2013; *Hypsopygia costalis* (F.), Blythburgh TM4575, East Suffolk (VC25), a suffused specimen.

FOREIGN LEPIDOPTERA

CORLEY, M. – Portuguese Lepidoptera with only one known locality. Approximately 10% of Portuguese Lepidoptera species are known from only single localities. Some records are based on a single specimen, while others have been repeatedly recorded in the same place over a number of years. Knowledge of the distribution of Portuguese moths is still relatively poor, but is gradually improving. Thus some of these species will be found in additional localities, but more species will be found for the first time in the country. Most of these rare species are likely to be genuine natives, in contrast to the British Lepidoptera list where species known from a single locality only are often rare migrants or adventives. Not surprisingly, the localities where the rarest species are found are mainly around the fringes of the country. Many species with a 'Euro-Siberian' distribution just reach the extreme north of Portugal, particularly in the lowlands of Minho province and the wet Serra da Peneda in the north-west and the more continental Serras de Montesinho and Nogueira in the north-east and Serra do Larouco, midway along Portugal's northern border. The Miranda do Douro plateau has a particularly continental climate. The Atlantic coast from Lisbon south to Cape St. Vincent coast has many rare species as does Serra da Estrela, the highest mountain range in Portugal, which reaches almost 2000 m. The Mediterranean climate of the south-facing coast of Algarve, together with the hot south-facing limestone hills of the Algarve and the salt marshes of the Rio Guadiana Estuary, also have many rarities. The Mediterranean climate extends far inland and to the north with some local hotspots for rarities such as Parque Natural de Tejo Internacional and the Tua valley. The last is due to be flooded in the next few years and these rarities will be lost from the country. Specimens were exhibited as indicated from the following areas: (1) Serra da Nogueira/Serra de

Montesinho: *Yponomeuta sedella* Treit., *Anchinia cristalis* Scop., *Aristotelia decoratella* Stgr., *Siona lineata* (Scop.), *Idaea luteolaria* Const., *Hypena obesalis* (Treitschke), *Gynaephora fascelina* L., *Athetis pallustris* (Hübn)., *Apamea sordens* (Hufn.), *Atethmia centrago* (Haw.), *Orthosia gracilis* (D.&S.), *Anorthoa munda* (D.&S.), *Mythimna comma* (L.), *Chersotis oreina* Dufay, *Agrotis clavis* (Hufn.). (2) Serra do Larouco: *Acleris emargana* (F.). (3) Serra da Peneda: *Nemophora albiciliellus* Stgr., *Digitivalva arnicella* Heyd., *Harpella forficella* Scop., *Chloroclysta miata* (L.), *Watsonarctia casta* Esp., *Panemeria tenebrata* Scop.. (4) Minho lowlands: *Plemyria rubiginata* (D.&S.), *Euphyia unangulata* (Haw.), *Cyclophora pendularia* Clerck. (5) Tua valley: *Scrobipalpa hyoscyamella* Stt., *Stenoptilia eborinodactyla* Zag., *Sciota rhenella* Zinck. (7) Miranda do Douro plateau: *Ocnogyna zoraida* Grasl. (8) Serra da Estrela: *Chrysoclista splendida* Karsh., *Dichrorampha cacaleana* H.-S., *Hadena luteocincta* Ramb., *Epipsilia latens* Hübn. (9) South-west coast: *Oporopsamma dunaria* Šump., *Axia margarita* Hübn., *Pelosia plumosa* Mabille, *Globia sparganii* Esp. (10) Tejo Internacional Parque Natural: *Digrammia rippertaria* Dup. (11) South Coast of Algarve: *Phtheochroa duponchelana* Dup., *Tegostoma comparalis* Hübn., *Sceliodes laisalis* Walk., *Eupithecia ultimaria* Boisd. (12) Rio Guadiana saltmarshes: *Scythris inertella* Zell., *Scopula decolor* Stgr. (13) Algarve limestone: *Rhypagla lacernaria* Hübn.

CURATOR OF BENHS COLLECTIONS. – Examples of drawers from the Society's permanent collections. Rather than depicting any particular species, this exhibit emphasises that there are several gaps in the BENHS Collection of European Lepidoptera, including many taxa that are common in areas where they occur. The Curator warmly invites donations of material from members and others to help complete this reference collection.

HAWKINS, R. D. – Examples of moths recorded at a holiday cottage at Barrau, Haumont, south-west France, 14 July 2013: *Pyropteron chrysidiformis* (Esper), the Fiery Clearwing and *Tyta luctuosa* (D.&S.), the Four-spotted. The exhibit was accompanied by a repeat of the offer made by BENHS member Jennifer Boncey for free accommodation at this holiday cottage in south-west France in return for information on the species present on her private nature reserve. For more information, please contact the exhibitor at e-mail: *rogerdhawkins@hotmail.co.uk*.

HONEY, M. R. – A small exhibit showing the species of the genus *Phyllonorycter sensu lato* that occur in the Balearic Islands. As a result of recent research and collecting the number of species known from the islands has increased from two (in 1981) to ten in 2013. The new additions being: *Phyllonorycter comparella* (Duponchel), *Phyllonorycter endryella* (Mann), *Phyllonorycter helianthemella* (H.-S.), *Phyllonorycter belotella* (Staudinger), *Phyllonorycter messaniella* (Zeller), *Phyllonorycter millierella* (Staudinger), *Phyllonorycter oxyacanthae* (Frey) and *Phyllonorycter schreberella* (F.). [Since the exhibition, *P. helianthemella* has been transferred to a newly described genus, *Triberta* De Prins, 2013].

LUCKENS, C. – (1) Melanic aberration of *Argynnis aglaja* (L.), near Kitici, Mucanj Massif area of central Serbia, 24.vi.2013. This was flying with several others. A typical example of *A. aglaja* was also shown for comparison. (2) aberrant form of *Melitaea trivia* (D.&S.), north of Pirot, Serbia, 26.vi.2013. There were numerous egg batches of *M. trivia* on roadside *Verbascum* and amongst the resulting second brood, reared in the open in the exhibitor's garden, this striking aberration appeared.

PICKLES, A. J. – A few autumnal days in Rhodes. Cathy and I were able to enjoy a few days in Rhodes this autumn and were able to run an MV lamp at our accommodation at Kalathos, near Lindos on the east of the island between 16 and 21 October. The site was 110 m above sea level at approximate coordinates N36°.74′ E:

28°.38′. Some of the interesting species encountered were shown as follows (in some cases the names allocated are provisional, as I have not had an opportunity to critically examine the specimens): Lasiocampidae: *Lasiocampa trifolii* (D. & S.). This was the commonest moth visiting MV light and specimens were mostly of this form. Note the larger size than British examples shown. The taxonomy of this highly variable species is confused. Subspecies (form) *cocles* Geyer has been applied to southern European populations, but de Freina and Witt (1987. *Die Bombyces bund Sphinges der Westpalaearktis*. Edition Forschung & Wissenschaft Verlag) state that the population in southern Greece is the nominotypical form. This specimen looks like the example of subspecies *mauritanica* Staudinger illustrated by Leraut (2006. *Moths of Europe. Volume 1: Saturnids, Lasiocampids, Hawkmoths, Tiger moths . . .*). Geometridae: *Dyscia raunaria* Freyer. This local species feeds on sage (*Teucrium*) and wormwoods (*Artemisia* spp.) and is found from Italy through to Greece. *Scopula imitaria* (Hübn.) ssp. *syriacaria* (Culot). This well-known British species is replaced with this strongly rosy form in Crete and the south-eastern Greek Islands. *Problepsis ocellata* (Frivaldszky). In Europe this species is restricted to south-east Europe and the Greek Islands and the larvae feed on olive (*Olea europaea*) and figs (*Ficus* sp.). Who could have a nicer diet? *Rhoptria aspersaria* (Hübn.). This highly variable species is local across southern Europe from Portugal to the Greek Islands. The form in which all wings are suffused with smoky grey is *pityata* Rambur. It was the second most frequent moth to our light. *Odontognophos sartata* (Treitschke). A congener of our *O. dumetata* Treitschke, this is another species confined to Italy and the south east of Europe. Leraut (*op. cit.*) states the flight time is June and July. It seems unlikely that this is a second brood example; so maybe there is a much longer emergence period in the extreme southeast of Europe. As with *O. dumetata* the foodplant is *Rhamnus*. Notodontidae: *Thaumetopoea solitaria* (Freyer). In spite of the name the larvae have the same habits as the other processionary moths. The food plant is pistachio (*Pistacia vera*). Erebidae: *Metachrostis velox* (Hübn.). This is a Mediterranean-Asiatic species the larvae of which live inside the poisonous fruits of *Anthericum* from which they presumably derive protection. *Metachrostis velocior* (Staudinger). This larger species is found at low altitudes amongst rocky, bushy habitats. The larvae are yet to be found. Noctuidae: *Pseudozarba bipartita* (H.-S.). This species is restricted to the warmest and driest parts of southern Europe, mainly in Spain Italy and Malta. It is recorded from mainland Greece, but is not recorded in Rhodes in either Hacker (1989. *Die Noctuidae Griechenlands (Lepidoptera, Noctuidae*) or Fibiger, Ronkay, Steiner & Zilli (2009. *Noctuidae Europaeae, volume 11. Pantheinae – Bryophilinae*). It appeared in some numbers at our light. *Condica viscosa* (Freyer). This multivoltine species is found from the Canaries through North Africa and southern Europe to the Middle East. The larvae feed on *Inula*. *Paradrina flavirena* (Guenée). The second generation of this species is very much smaller than the first; this is an adaptation to the dry Mediterranean summers. It is easily confused with *C. (Pa) levantina* Hacker and *C. (Pa) zandi minimus* Fibiger *et al*. Nevertheless, the broken outline of the reniform stigma seems diagnostic. *Episema glaucina* (Esper). Like *E. tersa* (D. & S.), also exhibited, the larvae feed on various species of Liliaceae, initially in the bulbs and subsequently on the leaves. The species is extremely variable, showing parallel forms to *tersa*. It has a similar, but more westerly range than *tersa*. *Episema tersa* (D. & S.). This extremely variable species is distributed in Europe from the Carpathian basin to southern Ural and most parts of the Balkans and Italy. Some forms closely resemble the insects I have provisionally considered to be *E.glaucina* and I will need to dissect all these *Episema* specimens to be sure of their identity. The distribution map in *Noctuidae Europaeae* does not show

this species on Rhodes and I am unsure of its status. *Polymixis(Bischoffia) bischoffi* (H.-S.) (Plate 8, Fig. 8), Ronkay, Yela & Hreblay (2001. *Noctuidae Europaeae volume 5: Hadeninae II*) record one European example of this species from the neighbouring island of Samos, besides Constantinople, the type locality. However a specimen from the Dodekanese Island of Kalymnos is illustrated in the same work, making at least two specimens! An editorial oversight, I presume. This specimen awaits dissection to confirm its identity and research to establish its Rhodean status. The only taxon with which it could easily be confused is *B. culoti* (Schawerda) ssp. *cretica* Ronkay & Varga, and I have a series of that species which has a distinct habitus. The early stages are unknown. *Agrotis trux* (Hübn.). This is the nominate subspecies of this variable species, not ssp. *lunigera* Stephens familiar in this country. *Agrotis bigramma* (Esper) = *crassa* (Hübn.). This species is strongly sexually dimorphic and these females are particularly strongly marked. The larva is subterranean and feeds nocturnally by poking its head above ground.

PLANT, C. W., HONEY, M. & GIUSTI, A. – Some scarce or locally-distributed moths from south-west Bulgaria, 4–9 August 2013. Following the 2014 Congress of the Societas Europaeas Lepidopterologica, which took place in The American University at Blagoevgrad, Bulgaria from 29 July to 4 August 2013, Colin Plant, Martin Honey and Alessandro Giusti stayed on for six nights of moth catching in the mountains of south-west Bulgaria. We teamed up with Ole Karsholt (Denmark), Nils Ryrholm (Sweden) and Boyan Zlatkov (Bulgaria) and set about light-trapping some sites of known high ecological interest. This exhibit presents a small selection of some of the moths caught at some of these sites. Most of these species were selected either because they are scarce or because they have a very restricted distribution in Europe. European distribution maps for most species were also presented next to the specimens. (1) From Kresna Gorge, Blagoevgrad Region, Struma Valley, 31.vii. & 4.viii.2013, N 41° 45′ 37.64″: E 23° 09′ 18.30″, altitude: 204 metres [670 feet] – Lasiocampidae: *Pachypasa otus* (Drury); Geometridae: *Scopula submutata* (Tr.), *Nychiodes amygdalaria* (H.-S.); Noctuidae (*sensu lato*): *Nyctobrya amasina* (Draudt), *Bryophila raptricula* (D. & S.), *Cryphia algae* (F.), *Cryphia ochsi* (Boursin), *Catocala sponsa* (L.), *Eublemma polygramma* (Dup.), *Haemerosia renalis* (Hübn.), *Denticera divisella* (Dup.), *Ephestia welseriella* (Zell.), *Episcythrastis tabidella* (Mann). (2) From the area around Granchar Lake in the Rila Mountains, 6.viii.2013, N 42° 07′ 18″: E 23° 35′ 39″, altitude: 2180 metres [7100 feet] – Arctiidae: *Arctia flavia* (Fuessly); Geometridae: *Aplocera simpliciata* (Tr.) ssp *balcanica* Züllich, *Entephria caesiata* (D. & S.), *Apamea maillardi* (Geyer) ssp. *maillardi* (Geyer). Noctuidae: *Catocala diversa* (Geyer), *Hypena obesalis* (Tr.), *Epipsilia grisescens* (F.) ssp. *grisescens* (F.), *Hadena caesia* (D. & S.), *Eriopygodes imbecilla* (F.), *Lasionycta proxima* (Hübn.), *Xestia ochreago* (Hübn.). (3) From Paril village (roadside fields and hills to the east), Blagoevgrad region, 7.viii.2013, N 41° 25′ 58″: E 23° 42′ 00″, altitude at roadside: 750 metres [2300 feet] – Pyralidae: *Pempeliella alibotuschella* (Drenowski); Noctuidae: *Amphipyra stix* H.-S., *Anthracia eriopoda* (H.-S.), *Catocala hymenaea* (D. & S.), *Divaena haywardi* (Tams), *Hadena vulcanica* Turati ssp. *urumovi* Drenowski, *Noctua interposita* (Hübn.). (4) From Orelyek in the Pirin Mountains, 8.viii.2013. N 41° 33′ 59″: E 23° 36′ 49″, at altitude 2064 metres [6700 feet] – Crambidae: *Catoptria casperella* Ganev; Pyralidae: *Bradyrrhoa gilveolella* (Tr.), *Selagia argyrella* (Hübn.); Arctiidae: *Setina irrorella* (L.); Geometridae: *Aplocera columbata* (Metzner), *Idaea metohiensis* (Rebel). Noctuidae: *Catocala conjuncta* (Esper), *Catocala elocata* (Esper), *Paradrina selini* (Boisduval). The first named exhibitor would be keen to hear from lepidopterists who may wish to accompany him on occasional collecting trips to Bulgaria; overseas collecting experience is not required, but successful travelling

companions must have an understanding of scientific names as opposed to English or other colloquial labels!

STERLING, M. – Moths from Hong Kong. (1) *Nemaphora* near *paradisea* Butler (Adelidae). Previously recorded once from the Sai Kung Peninsula, Hong Kong and from a nature reserve in Guangdong Province, China. Probably undescribed. (2) *Homona magnanima* Diakonoff (Tortricidae). Recorded from Japan and the Chinese mainland, this is the first record for Hong Kong. (3) *Fustis sterlingi* Fibiger (Micronoctuidae). This is the fourth known specimen of this species; the type and the other two specimens are held at the University Museum of Leiden. (4) *Cryptolechia* near *furcatella* Wang (Oecophoridae). First record from Hong Kong. Previously described from the Chinese mainland. (5) Immidae species. This is an obscure family of tropical microlepidoptera. At least in Hong Kong the ventral surface is more brightly coloured than the dorsal surface. Whatever its identity, the species shown will be new to Hong Kong. (6) *Attacus atlas* L. (Saturniidae). Bred from a female taken at light on 27.iv.2013 at Kadoorie Institute, New Territories, Hong Kong. (7) *Porphyrosela* near *dorinda* Meyrick (Gracillariidae). Bred from mines on 'Bean Vine' (plant species awaiting correct identification) collected on 1.v.2013 at Black Links, Hong Kong Island. This is the second species of *Porphyrosela* recorded from Hong Kong, the other species having been reared from *Desmodium*.

TERRY, RACHEL. – (1) Microlepidoptera from the Pyrénées Orientales, France. Ethmiidae: *Ethmia aurifluella* (Hübn.), *E. chrysopygella* (Kolenati). Oecophoridae: *Pleurota proteella* Stdgr., *P. ericella* (Duponchel), *P. gallicella* (Huemer & Luquet), *P. aristella* (L.), *P. honorella* (Hübn.). Lecithoceridae: *Eurodachtha canigella* (Caradja). Autostichidae: *Symmoca orphnella* (Rebel). Tortricidae: *Xerocnephasia rigana* (Sodoffsky), *Eana filipjevi* (Réal), *Cnephasia ecullyana* (Réal), *Lozotaenia cupidinana* (Stdgr.), *Cydia vallesiaca* (Sauter), *Dichrorampha agilana* (Tengström). Epermeniidae: *Epermenia scurella* (Stt.). Pyralidae: *Stemmatophora combustalis* (F. v. R.), *Actenia brunnealis* (Tr.), *Ephestia disparella* Hampson. Crambidae: *Catoptria bolivari* (Agenjo), *C. staudingeri* (Zeller), *Xanthocrambus saxonellus* (Zincken), *Metacrambus carectellus* (Zeller), *Metaxmeste schrankiana* (Hochenwarth), *Atralata albofascialis* (Tr.), *Evergestis frumentalis* (L.), *E. dumerlei* Leraut and *Udea austriacalis* (H.S.). (2) Lepidoptera from Clos des Manes, Pyrénées Orientales, France. Cossidae: *Dyspessa ululа* (Borkh.); Thyrididae: *Thyris fenestrella* (Scop.); Lasiocampidae: *Phyllodesma tremulifolia* (Hübn.); *Odonestis pruni* (L.); Sphingidae: *Sphinx maurorum* Jordan; *Hyles euphorbiae* (L.); Drepanidae: *Watsonalla uncinula* (Borkh.); *Cilix hispanica* De-Gregorio *et al*; Geometridae: *Isturgia famula* (Esper); *I. limbaria* (F.); *I. murinaria* (D. & S.); *Rhoptria asperaria* (Hübn.); *Campaea honoraria* (D. & S.); *Charissa mucidaria* (Hübn.); *Elophos dognini* (Thierry-Mieg); *Cyclophora lennigiaria* (Fuchs); *C. suppunctaria* (Zell.); *Scopula submutata* (Tr.); *S. rubiginata* (Hufn.); *Idaea sardoniata* (Homberg); *I. ochrata* (Scop.); *I. luteolaria* (Constant); *I. aureolaria* (D. & S.); *I. moniliata* (D. & S.); *I. circuitaria* (Hübn.); *I. subsaturata* (Guen.); *I. ostrinaria* (Hübn.); *I. deversaria* (H.-S.); *Anthometra plumularia* Boisd.; *Rhodostrophia vibicaria* (Cl.); *R. calabra* (Petagna); *Lythria sanguinaria* (Dup.); *Cataclysme riguata* (Hübn.); *C. dissimilata* (Rambur); *Scotopteryx coarctaria* (D. & S.); *Epirrhoe molluginata* (Hübn.); *Chesias isabella* Schawerda; Notodontidae: *Cerura erminea* (Esper); *Notodonta tritophus* (D. & S.); *Drymonia querna* (D. & S.); *Rhegmatophila alpina* (Bellier); Erebidae: *Dysauxes ancilla* (L.); *Dysauxes punctata* (F.); *Dysauxes servula* (Berce); *Watsonarctia casta* (Esper); *Cymbalophora pudica* (Esper); *Rhyparia purpurata* (L.); *Hyphoraia testudinaria* (Fourcroy); *Atlantarctia tigrina* (Villers); *Catocala conversa* (Esper); *Catocala nymphagoga* (Esper); *Catocala nymphaea* (Esper); Noctuidae: *Bryonycta pineti*

(Stdgr.); *Hadula pugnax* (Hübn.); *Hadena magnolii* (Boisd.); *Hadena filograna* (Esper); *Hadena silenes* (Hübn.); *Conisania renati* (Oberthür); *Thysanoplusia daubei* (Boisd.); *Abrostola asclepiadis* (D. & S.); *Dichagyris musiva* (Hübn.); *Ochropleura plecta* (L.) *unimacula* Stdgr.; *Noctua interposita* (Hübn.); *Noctua tirrenica* (Biebinger *et al*); *Epilecta linogrisea* (D. & S.); *Chersotis multangula* (Hübn.); *Dichagyris renigera* (Hübn.) and *Yigoga signifera* (D. & S.).

Diptera

Chandler, P. J. – (1) *Dioctria cothurnata* Meigen (Asilidae), Dundreggan, Inverness-shire, in herb-rich meadow by the River Moriston, 8 and 11.vii.2013, ♂ and ♀, the sexes with contrasted leg colour: ♂ black with yellow bases to femora; ♀ reddish (so resembling *D. rufipes* (De Geer)). It was recorded in the same area by Graham Rotheray in 2010, prior to that there were only old Scottish records from Perthshire and Inverness-shire, although it was often recorded in the Spey Valley early in the 20th century, and recent records from Cumbria indicate that it is still well-established there.

(2) *Rainieria calceata* (Fallén) (Micropezidae), Bushy Park, Middlesex, ♀ swept around dead fallen tree in Waterhouse Plantation, 27.vi.2013; several were seen nearby on logs in the adjoining woodland garden. Mostly recorded from the Windsor area of Berkshire, but there are recent records from four sites in Surrey (1997 to 2001) and from Burnham Beeches, Buckinghamshire (1996). It develops in decaying beech wood; there is no beech now at the Bushy Park site, but one old tree had formerly existed in the vicinity.

(3) *Borboropsis puberula* (Zetterstedt) (Borboropsidae, sometimes treated as a subfamily of Heleomyzidae but it lacks the usual costal spines of that family) ♂ Migdale Wood, Sutherland, 26.vi.1999 and ♀ Loch an Eilein, Inverness-shire 13.ix.2013. Both were swept from low vegetation, mainly bilberry *Vaccinium myrtillus*, in *Pinus* woodland; an easily overlooked species of Caledonian pine forest, and of unknown biology. Previous British records are from Aviemore (Collin, J. E. 1943. The British species of Helomyzidae (Diptera). *Entomologist's monthly Magazine* **79:** 234–251), and Abernethy Forest (1986, 1991). It may be regarded as a boreo-alpine species, with its European distribution including Scandinavia and central Europe.

(4) *Hyalurgus lucidus* (Meigen) (Tachinidae), Dundreggan, Inverness-shire, ♀ at hogweed *Heracleum sphondylium* flowers in field near the Lodge, 11.vii.2013. Most recently recorded in Britain in the Wyre Forest, Worcestershire in 1938, and considered to be possibly extinct in Britain, so this was an unexpected find. This is a parasitoid of nematine sawfly larvae on trees and shrubs, and adults are usually recorded as visiting umbel flowers. Previous British records are from the Welsh borders (Herefordshire, Worcestershire and Radnorshire), apart from two old Scottish records (Logie, 1902; Flowerburn, 1918). It is widespread in Europe so there is no obvious reason for its scarcity in Britain.

Dickson, R. J. – Some Diptera found in S Hampshire (VC 11) in 2013: *Tipula alpium* Bergroth (Tipulidae) ♂, Hen Wood nr West Meon, broad-leaved woodland on chalk, 23.viii, at MV light; *Orthonevra brevicornis* (Loew) (Syrphidae) ♀, Roydon Woods NR (SZ3199), New Forest, 7.vi, at MV light, a surprise to have come to light; *Tephritis leontodontis* (De Geer) (Tephritidae) ♂, Brownwich cliffs (SU5203), 3.vi, fairly common here on *Crepis* sp. flowers growing near the base of the soft cliffs; *Pherbellia argyra* Verbeke (Sciomyzidae) ♂, Portsdown (SU6806), 24.ix, known to develop in aquatic snails so a surprise at this site; *Admontia seria* (Meig.)

(Tachinidae) ♀, Hen Wood nr West Meon, 30.viii, at MV light, a parasitoid of cranefly larvae in rotten wood.

HALSTEAD, A. J. – Some local or scarce Diptera taken in 2013: *Nephrotoma crocata* (L.) (Tipulidae), ♀ on a gooseberry bush, 30.v, allotments, Brookwood (SU958572), Surrey; *Haematopota bigoti* Gobert (Tabanidae), ♀ swept, 8.vii, Leighton Moss RSPB Reserve (SD482750), Lancs; *Oxycera morrisii* Curtis (Stratiomyidae), ♀ swept, 11.vii, Heathwaite, Arnside (SD450768), Lancs; *Myopa extricata* Collin (Conopidae), ♀ found inside house, 2.v, Knaphill (SU964587), Surrey; *Meligramma guttatum* (Fallén) (Syrphidae), ♀ swept, 23.viii, River Bourne, Addlestone (TQ050635), Surrey; *Didea fasciata* Macquart (Syrphidae) ♀ and *Stomorhina lunata* (F.) (Calliphoridae) ♂, on *Clematis* flowers, 19.ix, garden, Knaphill (SU964588), Surrey; *Trypeta immaculata* (Macquart) (Tephritidae), ♀ swept, 10.vii, Grize Dale (SD513480), Lancs; *Sapromyza albiceps* Fallén (Lauxaniidae), ♂ swept, 19.vi, Brookwood Country Park (SU962576), Brookwood, Surrey; *Clusia tigrina* (Fallén) (Clusiidae), ♂ inside house, 24.ix, Knaphill (SU964588), Surrey; *Conisternum decipiens* (Haliday) (Scathophagidae), swept, ♂ 17.v and ♀ 24.x, Heather Farm (SU994607), Mimbridge, Surrey; *Cylindromyia interrupta* (Meigen) (Tachinidae), ♂ swept, 8.vi, Abbotts Wood (TQ561071), nr Hailsham, Sussex; *Subclytia rotundiventris* (Fallén) (Tachinidae), ♀ swept, 27.viii, Heather Farm (SU994607), Mimbridge, Surrey.

HARVEY, M. C. – Updates from the "Soldierflies and allies recording scheme", including a display of ♂ and ♀ specimens of the Downland Villa bee-fly *Villa cingulata* (Meigen), respectively from Oxfordshire in 2008 and Middlesex in 2013, along with a distribution map showing the 21st century recovery of this species after its disappearance from records in the latter half of the 20th century. Information was also provided on a new photographic guide to robberflies of the Netherlands and Belgium, by Reinoud van der Broek and André Schulten, available as a free download from: bit.ly/robberfly. A copy of the latest recording scheme newsletter, and information on submitting records to the scheme were also displayed.

HODGE, P. J. – Part of an exhibit of 22 species of insects discovered as new to Britain between 1971 and 2012, including six species of Diptera. (1) *Haematopota subcylindrica* Pandellé (Tabanidae), Pett Level (TQ901144), East Sussex, 6.vii.1987 and Camber Castle (TQ920183), East Sussex, 28.vi.1994, females swept (Hodge, P. J. & Grayson, A. 1996. *Dipterists Digest* (*Second Series*) **3:** 36–37); (2) *Iteaphila arundela* Shamshev & Sinclair (Empididae) [♂ holotype in Natural History Museum (London), Arundel Park (TQ005108), West Sussex, 1.iv.1988, on dog's mercury *Mercurialis perennis*] ♀ paratype exhibited, Arundel Park (TQ005108), 2.v.1990, swept off flowers of field maple *Acer campestre* (Shamshev, I. V. & Sinclair, B. J. 2009, *European Journal of Entomology* **106**: 441–450), endemic to England, currently recorded from Arundel Park, West Sussex and Wychwood Forest, Oxfordshire; (3) *Hercostomus verbekei* Pollet (Dolichopodidae), Barton Mills (TL7274), East Suffolk, 17.vii.1987, 2 ♂ swept on bank of River Lark (Pollet, M. 1993. *Zoologica Scripta* **22**(1)**:** 101–109 and Hodge, P. 1993. *Empid and Dolichopodid study group newssheet* No. 12, p. 3) a sibling species of *H. plagiatus* (Loew); (4) *Lamprochromus strobli* Parent (Dolichopodidae), Lewes (now part of the Railway Land Local Nature Reserve) (TQ419099), East Sussex, 4.vi.1987, 2 ♂ swept in wet woodland dominated by crack willow *Salix fragilis* and containing several calcareous springs (Hodge, P. 1988. *Dipterists Digest* **12**: 28–29); (5) *Syntormon silvianus* Pârvu (Dolichopodidae), Par Brook (TQ081249), Billingshurst, West Sussex, 13.vi.1997, many examples of both sexes swept (Hodge, P. 1993. *Empid and Dolichopodid study group newssheet* No. 12, p. 3), a recently described species split from *S. monilis* (Haliday in Walker);

(6) *Tephritis divisa* Rond. (Tephritidae), Bersted Brooks Local Nature Reserve (SU937013), Bognor Regis, West Sussex, 13.viii.2005, one swept (Hodge, P. 2006. 2005 Annual Exhibition. *British Journal of Entomology and Natural History* **19**: 182, Pl. 4 Fig. 17; May, P. & Hodge, P. 2006. *Bulletin of the Amateur Entomologists Society* **65**: 200–208), currently established in several counties in south-east England, associated with bristly ox-tongue *Helminthotheca echioides*.

MILES, S. R. – A report on the results of the BENHS Heathland Flies' Project concerning the Mottled Bee-fly, *Thyridanthrax fenestratus* (Fallén) (Bombyliidae), including a summary of its distribution, and a request for additional records. As a result of 15 years work by up to 25 participants, it was currently known by the exhibitor to occur in 67 separate sites in S and SE England, in the following counties: **Berkshire:** one current site, where at most only two specimens may be seen in a 1km square on any one sunny day in the right season; there are two historic sites of occurrence where this species has not been seen since 1942 and 1904 respectively. **Dorset:** 33 current sites, at which only one 1km square (at Studland Heath) up to 2008 were more than 5 specimens readily seen on one sunny day in the flight season; at two historic sites it has not been seen post-1963. **Hampshire:** 8 sites in NE Hampshire and a further 7 heathland sites in the New Forest, making 15 current sites in all for the county; in none of these have more than 4 adults been seen in any one 1km square on any single sunny day in the flight season; there are 2 historic sites in the New Forest where it has not been observed post-1953. **Surrey:** 13 sites, with Chobham Common comprising two sites, respectively north and south of the M3 Motorway, while Frensham Common, though split by a N–S road, is considered as one site; in only six 1km squares have more than 5 been seen on any one sunny day in the flight season up to 2009 (i.e. Chobham Common (S), Sunningdale Golf Course, Brentmoor Heath, Witley Common and Thursley Common, at the latter site only seen up to 2006 before a fire); there are 5 historic sites in Surrey where it formerly occurred up to 1967. **Sussex:** 5 current sites, though one is continuous with a Hampshire site, Weaver's Down at Longmoor; in only four 1km squares have more than 5 been seen on any one sunny day in the flight season up to 2007 (i.e. Stedham Common, Iping Common and Ambersham Common); at 3 historic sites it has not been seen since pre-1990. Thus it occurs currently in 22 10km squares, with records historically only for a further 4 10km squares up to 1993.

PARKER, M. J. – Uncommon Diptera recorded in Dorset (VC 9) in 2013, except in one case of a 2012 record: *Chorisops nagatomii* Rozkošný (Stratiomyidae) ♂ and ♀ in sycamore copse bordering derelict farmland in Weymouth (SY662784), 27.viii; *Didea fasciata* Macquart (Syrphidae) ♂ basking on elm leaf in garden at Weymouth (SY661791), 4.x; *Eupeodes bucculatus* (Rond.) (Syrphidae) ♂ at Bowshot Coppice area of Wootton Fitzpaine (SY345958), 21.vii; *Melieria picta* (Meigen) (Ulidiidae) ♂ swept from coastal vegetation near Abbotsbury (SY567840), 6.viii; *Campiglossa producta* (Loew) (Tephritidae) ♀ swept from chalk downland in Portesham area (SY592861), 20.viii; *Gastrolepta anthracina* (Meigen) (Tachinidae) ♂ basking on a bramble leaf in exhibitor's garden at Weymouth (SY661791), 27.viii; *Loewia foeda* (Meigen) (Tachinidae) ♂ swept from vegetation adjacent to shingle at the coastal area of Abbotsbury (SY552850), 14.vii; *Loewia submetallica* (Macquart) (Tachinidae), ♂ swept from vegetation adjacent to shingle at the coastal area of Abbotsbury (SY552850), 14.vii; *Eumea mitis* (Meigen) (Tachinidae), a recent addition to the British list, ♀ Oakers Wood (SY850915), 27.v.1912; *Athrycia curvinervis* (Zetterstedt) (Tachinidae) adjacent to derelict farmland in Weymouth (SY662784), 27.viii; *Eurithia vivida* (Zetterstedt) (Tachinidae), ♀ basking on foliage in exhibitor's garden at Weymouth (SY661791), 22.x; *Policheta unicolor* (Fallén) (Tachinidae), 2 ♀ swept

from vegetation adjacent to or on shingle at the coastal area of Abbotsbury (SY549852), 4.ix.

SMITH, M. N. – Some uncommon flies taken in 2013: *Callicera aurata* (Rossi) (Syrphidae), visiting ragwort flowers on a small brownfield site in the centre of Basingstoke (SU641525), 8.viii, although a saproxylic species (larvae develop in wet rot holes), this species is sometimes recorded well away from typical wooded habitats as with this specimen; *Linnaemya picta* (Meigen) (Tachinidae), 2 ♂, from sites adjacent to Heathrow Airport, the Colne Valley (TQ042763), 29.viii and the Causeway Reserve (TQ107753), 3.ix, recognised as a British species in 2009 from a specimen found in Kent, a number of specimens taken in Kent in the mid-1950s (NHM collection) were also found to be this species and had previously been confused with the montane species *Linnaemya rossica* Zimin; it has since 2009 been recorded from Suffolk and Cambridgeshire and a distribution map was displayed; *Cistogaster globosa* (F.) (Tachinidae), ♂ and ♀ visiting yarrow in tall grassland in the Colne Valley (TQ04327631), 29.viii, although accorded RDB status in JNCC reviews, this species seems to be increasing its range in England, probably in response to warmer summers, and is now probably best regarded as Nationally Scarce.

SIMS, I. – *Ctenophora ornata* Meigen (Tipulidae), ♂ at Rothamsted light trap, Jealott's Hill, Berks, 11.vii.2013; the locality is an outlier of Windsor Great Park and has many relict species remaining from the time that it was integral to the Park.

COLEOPTERA

BARNES, C. A. – *Badister unipustulatus* Bonelli (Carabidae), Langford Lowfields RSPB reserve, Nottinghamshire, SK8160, found in flood debris following over-topping of the River Trent, 16.xii.2012, third record for Nottinghamshire. *Lebia chlorocephala* (Hoffmann) (Carabidae), between Woodhall Spa and Horncastle, North Lincolnshire, TF2466, along disused railway, 6.v.2011, third record for North Lincolnshire, last recorded in 1895. *Demetrias imperialis* (Germar) (Carabidae), Huttoft Pit Lincolnshire Wildlife Trust reserve, North Lincolnshire, TF533791, 7.vii.2011. *Nicrophorus humator* (Gleditsch) (Silphidae), Nocton Rise, South Lincolnshire, TF043644, at light, 10.viii.2013, a not-so-black "Black Sexton Beetle", presumably a teneral specimen. *Cantharis paludosa* Fallén (Cantharidae), Nettleton, North Lincolnshire, TF110975, 27.v.2012, third record for North Lincolnshire, last recorded in 1910 at Freshney Bog, TA20. *Rhagonycha lutea* (Müller) (Cantharidae), Whisby Nature Park, South Lincolnshire, SK9166, collected at MV light, 12.vii.2013 and also swept from birch scrub, 13.vii.2013. *Hallomenus binotatus* (Quensel) (Tetratomidae), Allington Meadows, South Lincolnshire, SK8739, found under dry wood, 8.vi.2013. *Metoecus paradoxus* (L.) (Ripiphoridae), Whisby Nature Park, South Lincolnshire, SK9166, a female collected by R. Davidson, 30.vii.2011, second record for South Lincolnshire and Caistor, North Lincolnshire, TA1100, a male collected by M. Schofield, August 2013, third record for North Lincolnshire. *Meloe proscarabaeus* L. (Meloidae), Ropsley, South Lincolnshire, TF0034, small colony reported by C. Brown on roadside verge surveyed as part of Lincolnshire Wildlife Trust "Life on the Verge" project, 10.iv.2012, first record for South Lincolnshire. *Bromius obscurus* (L.) (Chrysomelidae), Scunthorpe, North Lincolnshire, SE8610, along dismantled railway, 29.vi.2013, found to be widespread in Scunthorpe after initial discovery by J. Davison and E. Gaunt, known only from one other UK locality on the Cheshire/Staffordshire border, but 'mentioned' from Lincolnshire in 1831. *Bruchela rufipes* (Olivier) (Anthribidae), Baston Fen, South Lincolnshire, TF144154, 1.vii.2012. *Otiorhynchus crataegi* Germar (Curculionidae), Nocton Rise,

South Lincolnshire, TF043644, found by torch light on wall in garden, 2.x.2012. *Isochnus sequensi* (Stierlin) (Curculionidae), Tupholme, North Lincolnshire, TF143084, bred from leaf mine on *Salix* species, 12.ix.2013, survey work has shown this species to be widespread in both South and North Lincolnshire. *Kissophagus vicinus* (Comolli) (Curculionidae), Mayflower Wood, North Lincolnshire, TA1616, 8.ix.2012.

BOOTH, R. G. – A few recent captures. *Chaetarthria seminulum* (Herbst) (Hydrophilidae), Wicken Fen, Cambridgeshire, TL5670, one male by sieving wet litter and moss, 1.vii.2013, a record of the true *seminulum*, not the recently described and apparently more common *C. simillima* Vorst & Cuppen. *Bledius diota* Schiødte (Staphylinidae), Holkham Bay, West Norfolk, TF8945, by digging in area of damp, flat sand with a mud layer and sparse, salt-marsh vegetation, 4.vii.2013, apparently the first record for a number of years. *Acrotona pseudotenera* (Cameron) (Staphylinidae), Haseley Manor, Isle of Wight, SZ546857, by sieving a fresh wood-chip pile, 21.ix.2012, a new vice-county record for this recent immigrant. *Alevonota elegantula* (C. Brisout de Barneville) (Staphylinidae), Laleham, Middlesex, TQ0669, one male in a flight interception trap near the edge of a small wood, 18–25.v.2013, this species name, used in the older British literature, was omitted erroneously from Duff's 2012 edition of his Checklist of beetles of the British Isles apparently as a result of confusion involving the former and new use of the name *A. rufotestacea* (Kraatz). *Korynetes caeruleus* (De Geer) (Cleridae), Wicken Fen, Cambridgeshire, TL5670, one female beaten from the very old willow tree just outside the entrance to the Visitor Centre, 1.vii.2013. *Pediacus depressus* (Herbst) (Cucujidae), Ockham Common, Surrey, TQ0858, a pair taken on a fallen pine trunk, 27.viii.2012. *Enedreytes sepicola* (F.) (Anthribidae), Church Wood, Blean, East Kent, TR1259, one female by beating dead oak branch, 2.ix.2012. *Polydrusus confluens* Stephens (Curculionidae), Kelling Heath, East Norfolk, TG099421, several seen while beating gorse, 5.vii.2013, the first Norfolk record for several years. *Barypeithes sulcifrons* (Boheman) (Curculionidae), Bridlington, South East Yorkshire, TA173648, one male picked up from loose sand from a small area of sparsely vegetated dunes below the low cliff, 8.iv.2013, most records of this species are from the southwest of England.

COLE, J. – Pictures of *Polydrusus flavipes* (De Geer) and *Polydrusus impressifrons* Gyllenhal (Curculionidae), the latter new to Britain from Beale Park Wildlife Park and Gardens, Lower Basildon, Berkshire, SU617781, on trunk of mature English oak, 14.vi.2013.

DARBY, M. – (1) The British Ptiliidae. Sixty-two of the 74 currently listed British Ptiliidae species were exhibited. In compiling his collection Michael acknowledged the help received from Tony Drane, Martin Collier, John Owen, Peter Hammond and, in particular, Colin Johnson who inspired and encouraged his early interest in the family. (2) Three drawings, *Emus hirtus* (L.) (Staphylinidae), *Ocypus olens* (O. F. Müller) (Staphylinidae), and the Chilean featherwing beetle *Smicrus cekalovicii* Darby & Johnson (Ptiliidae), showing how computers may be used in entomological illustration. The drawings, all done with a desk top PC and a mouse using Corel software, are part of the Exhibition *Facing up to Beetles: The Entomologist's Perspective* shown at the Royal Entomological Society's recent York meeting, and planned for the Oxford Museum in 2014.

HODGE, P. J. – (1) Seven species of Coleoptera collected in Surrey and Sussex during 2013. *Bembidion octomaculatum* (Goeze) (Carabidae), Maxfield Nature Conservation Trust Reserve, Brede valley, East Sussex, TQ84141747, in aquatic sample from dyke, 6.viii.2013. *Astrapaeus ulmi* (Rossi) (Staphylinidae), Lewes, East

Sussex, TQ41971050, male on footpath in Tesco car park, 12.xi.2013, a new site for this recent colonist [six specimens found in moss in The Coombe, Lewes, East Sussex, TQ4311, 1 & 6.iv.2012, Tom Harrison (pers. comm.)]. *Agrilus cyanescens* Ratzeburg (Buprestidae), Wisley Common, Surrey, TQ07015883, two on aspen *Populus tremula* foliage, 19.vi.2013, a new county record. *Elater ferrugineus* L. (Elateridae), Foxwood, Maresfield, East Sussex, TQ46522478, male flew onto tablecloth in private garden, most probably attracted by residual pheromone on my shirt, 21.viii.2013, new to East Sussex. *Lymexylon navale* (L.) (Lymexylidae), Box Hill, Surrey, TQ17705175, female swept in open chalk grassland, 26.vii.2013. *Pyrrhidium sanguineum* (L.) (Cerambycidae), Spring Wood, Knepp Castle Estate, West Sussex, TQ15122224, several on stack of oak logs, 1.vi.2013. *Ceutorhynchus inaffectatus* Gyllenhal (Curculionidae), Lilac Cottage, Norlington Lane, Ringmer, East Sussex, TQ44711327, a few on dame's violet *Hesperis matronalis* in private garden, 20.vi. and 6.vii.2013, new to East Sussex and the second British locality for this weevil.

(2) Celebrating 60 years of entomological discovery, 1953–2013; part of an exhibit of 22 species of insects discovered new to Britain between 1971 and 2012 including 11 species of Coleoptera. *Alaobia linderi* (Brisout de Barneville in Grenier) (Staphylinidae), Barle valley, Dulverton, South Somerset, SS868306, female in *Polyporus* on ash *Fraxinus excelsior* stump, 16.vi.1994, and Newhaven, East Sussex, TQ448000, sieved from pigeon droppings inside a disused building, thought to be a World War II radar implacement, on a ledge near the top of the cliffs, 8.iv.1998 (Hodge, 2003, *Br. J. Ent. Nat. Hist.* **16**: 183). *Astrapaeus ulmi* (Rossi) (Staphylinidae), Newhaven, East Sussex, TQ449001, male under stone on undercliff, 16.v.2004 [recognised as a species new to Britain by David Hance who collected another male from the same locality at TV445999 on 11.iv.2005 (Hance, 2007, *The Coleopterist* **16**: 1–2). *Tetartopeus rufonitidus* (Reitter) (Staphylinidae), Rye Harbour, East Sussex, TQ931192, male collected from litter at margin of reed-bed, 12.iv.1992 (Hodge, 1992, *The Coleopterist* **1**: 3), previously known in the British Isles only from Tresco in the Isles of Scilly. *Agrilus cuprescens* (Ménétriés) (Buprestidae), Beckton, South Essex, TQ439815, on bramble *Rubus fruticosus* foliage, 8.vi.2008 (Hodge, 2010, *The Coleopterist* **19**: 85–88). *Agrilus cyanescens* Ratzeburg (Buprestidae), Beckton, South Essex, TQ43988167, male on *Salix* foliage, 8.vi.2008, by Mike Edwards (Hodge, 2010, *The Coleopterist* **19**: 85–88), there are recent records for several English counties. *Ptinus dubius* Sturm (Ptinidae), Mildenhall Warren, East Suffolk, TL7474, beaten off pine *Pinus* sp., 9.vi.1979, John Parry discovered the first specimen (Hodge & Parry, 1982, *Entomologist's Mon. Mag.* **117**: 225–226). *Bruchidius varius* (Olivier) (Chrysomelidae), Ditchling Beacon, East Sussex, TQ331131, female swept in chalk grassland, 9.x.1994 (Hodge, 1997, *The Coleopterist* **5**: 65–68). *Bruchidius imbricornis* (Panzer) (Chrysomelidae), St Clere's Golf Course, Stanford-le-Hope, South Essex, TQ671813, beaten off hawthorn blossom, 13.v.2012 (Hodge, 2012, *The Coleopterist* **21**: 136–139), larvae develop in the seed pods of goat's-rue *Galega officinalis*, subsequently found on its host plant at this site and another locality close to the River Thames in West Kent. *Pseudoperapion brevirostre* (Herbst) (Apionidae), Beckton, South Essex, TQ439816, swept off perforate St John's-wort *Hypericum perforatum*, 22.v and 8.vi.2008 (Hodge, 2011, *The Coleopterist* **20**: 111–115), larvae develop in the flower heads. *Ceutorhynchus inaffectatus* Gyllenhal (Curculionidae), Hammer Wood, Chithurst, West Sussex, SU842242, on dame's violet *Hesperis matronalis*, 28.vi and 5.vii.2012 (Hodge, 2013 *The Coleopterist* **22**: 20–23), discovered at Ringmer, East Sussex on 28.vi.2013. *Magdalis memnonia* Gyllenhal (Curculionidae), Friston Forest, East Sussex, female on grass stem, 12.vii.1971 (Allen, 1972, *Ent. Rec. J. Var.* **84**: 22–23), now widely distributed in south-east England.

SIMS, I. – *Typhaeus typhoeus* (L.) (Geotrupidae), Jealott's Hill, Berkshire, iv.2010. *Platyrhinus resinosus* (Scopoli) (Anthribidae), Jealott's Hill, Berkshire, one of three seen on cramp ball fungus, *Daldinia concentrica*, on trunk of ash tree, 28.iv.2010. *Sitona waterhousei* Walton (Curculionidae), Moor Green, Finchampstead, Berkshire, swept from meadow, 29.ix.2011, new to Berkshire.

WILLIAMS, S. – Curation of the Society's Coleoptera collection. In order to show progress on this work being done at the Oxford University Museum of Natural History, three completed drawers were displayed, together with one drawer that was yet to be worked on. Nearly 20,000 specimens out of an estimated 35,000 had already been completely re-curated, including 23 families, as far as Scarabaeidae in the order of the latest checklist. All the re-curated specimens had been re-staged on new pins, many had been cleaned and all had been supplied with a new label stating the species they were standing over in the old arrangement, and the fact that the specimen belonged to the BENHS. This will enable specimens to be examined, loaned and moved with ease. A database listing all the species, with the number of examples of each from the collection, had been created, enabling a quick way of searching the collection via computer. The exhibitor commented that the strength and depth of the BENHS collection had become apparent, since a large majority of species possessed over 10 examples and that gaps in the collection were not a large percentage of the species present. He thanked the Society for giving him the opportunity to work on such an excellent collection.

HEMIPTERA

HODGE, P. J. – (1) Two species of Hemiptera from Warwick Gardens, Peckham, south-east London (VC15: West Kent), TQ338762, on 13.ix.2013. *Raphigaster nebulosa* (Pentatomidae) not Miridae, beaten off mixed foliage, a frequent species in Continental Europe; *Orientus ishidae* (Matsumura) (Cicadellidae), a Japanese species, one swept off foliage of *Eucalyptus*. Both are recent colonists in Britain and have previously been recorded from London, including this site.

(2) Part of an exhibit of 22 species of insects discovered new to Britain by the exhibitor between 1971 and 2012 including five species of Hemiptera. *Nysius senecionis* (Olivier) (Lygaeidae) Holman Wood, East Sussex, TQ794201, 20.ix.1992, on ragwort *Senecio jacobaea* (Hodge, 1997, *Br. J. Ent. Nat. Hist.*, **10**: 1–2), this bug has spread rapidly and now occurs commonly in many parts of Britain; *Macrotylus horvathi* (Reuter) (Miridae), Queenborough, East Kent, TQ916717, 22.vii.2005, on black horehound *Ballota nigra*, (Hodge, 2006, *Br. J. Ent. Nat. Hist.*, **19**: 190), a specimen was exhibited as new to Britain at the 2005 BENHS Annual Exhibition but there is an earlier unpublished record by Peter Kirby who found it in 2004 whilst surveying for the new high speed rail link in East Kent.; *Orthotylus junipericola* (Reuter) (Miridae), Kingston-upon-Thames, Surrey, TQ62257395, 15.ix.2008, on an open grown Lawson's cypress in cemetery (Hodge, 2009, *Br. J. Ent. Nat. Hist.*, **12**: 180), there are several as yet unpublished records for the London district but this one appears to be the first for Britain, exhibited at the 2008 BENHS exhibition as the second British site for *Orthotylus caprai* Wagner (Miridae) which was later found to be misidentified; *Acericerus heydenii* (Kirschbaum) (Cicadellidae), St Osyth Priory, North Essex, TM11731670, 26.vii.2010, swept off sycamore *Acer pseudoplatanus* foliage (Hodge, 2012, *Br. J. Ent. Nat. Hist.*, **25**: 174), previously exhibited at the 2011 BENHS exhibition, although it has subsequently been recorded widely in the London district and also at Brighton, East Sussex, this was the first British record; *Fieberiella florii* (Stål) (Cicadellidae) Guinness Mounds, Park Royal, Ealing,

Middlesex, TQ191823, 16.ix.1998, swept off cherry saplings (Hodge, 1999, *Br. J. Ent. Nat. Hist.*, **12**: 180), subsequently recorded from a few other sites in the London area, exhibited at the 1998 BENHS exhibition.

STEWART, A. J. A. – *Eurysanoides* (=*Eurysa*) *douglasi* (Scott) (Delphacidae), Winding Bottom, near Lancing, West Sussex, VC13; TQ 191087; one brachypterous male, one macropterous male, one brachypterous female, one macropterous female, all 7.ix.2013.

TERRY, R. – Various Auchenorrhyncha species collected at MV light in 2012 & 2013; Barnet, Middlesex; VC21; TQ 258967; *Orientus ishidae* (Matsumura) (Cicadellidae), 12.ix.2013; *Liguropia juniperi* (Lethierry) (Cicadellidae), 21.x.2013; *Kybos calyculus* (Cerutti) (Cicadellidae), 4.x.2013; *Synophropsis lauri* Horvath (Cicadellidae), 21.x.2013; *Lamprotettix nitidulus* (F.) (Cicadellidae), 2.viii.2012; *Acericerus heydenii* (Kirschbaum) (Cicadellidae), 27.x.2013; *Eupteryx decemnotata* Rey (Cicadellidae), 19.6.2013; *Zyginella pulchra* Low (Cicadellidae), 23.iv.2013; *Linnavuoriana decempunctata* (Fallén) (Cicadellidae), 21.x.2013; also at same site *Eupteryx florida* Ribaut (Cicadellidae) recorded on *Ballota nigra*, 4.vii.2013; *Metidiocerus rutilans* Kirschbaum (Cicadellidae) on *Betula pendula*, 1.vii.2013.

HYMENOPTERA

DICKSON, R. J. - *Stauropoctonus bombycivorus* (Gravenhorst), Bishop's Inclosure nr Shirrell Heath SU5814, S. Hampshire (VC11) 28.vi.2013, MV; *Enicospilus ramidulus* (L.) ♀, Hen Wood nr West Meon, S. Hampshire (VC11), 23.viii.2013, MV; *Opheltes glaucopterus* (L.), Orchard Copse nr Wickham Common, SU5910, S. Hampshire (VC11), 4.x.2013, MV; *Ophion ventricosus* Gravenhorst ♂, Roydon Woods NR, New Forest, SZ3199, S. Hampshire (VC11), 7.vi.2013, MV; *Netelia infractor* Delrio ♂, Titchfield Haven NNR, S. Hampshire (VC11), 9.viii.2013, MV; *Zele infumator* (Lyle) ♂, Roydon Woods NR, New Forest, SZ3199, S. Hampshire (VC11), 7.vi.2013 MV; *Zemiotes albiditarsis* (Curtis) ♀♀; West Walk SU6012, S. Hampshire (VC11), 31.v.2013, MV, Roydon Woods NR, New Forest, SZ3199, S. Hampshire (VC11), 7.vi.2013, MV. Details of the Nocturnal Ichneumonoidea Recording Scheme and Workshop provided.

HALSTEAD, A. J. – Some local or scarce sawflies taken or bred in 2013. Diprionidae: ♂, ♀ *Monoctenus juniperi* (L.), bred from larvae on juniper emerged. 2.v.2013, larvae col. 27.vii.2012, Lagganlia Centre, nr Kingussie, E. Invernesshire, NH853041. Tenthredinidae: ♀ *Paracharactus* (*Dicrostema*) *gracilicornis* (Zadd.), swept from moschatel, 23.iv.2013, old quarry, Mousehill Down, nr Milford, Surrey SU936422; ♀ *Pseudodineura fuscula* Klug, swept, 21.v.2013, River Bourne at Addlestone, Surrey TQ051636; ♀ *Tomostethus nigritus* (F.), swept, 7.vi.2013, Park Wood, nr Hailsham, Sussex TQ599125 – soon to become very rare due to the demise of ash, its larval food plant?; ♀ *Cladius grandis* (Serville), bred from larvae on *Populus nigra* emerged 9.v.2013, larvae col. 13.ix.2012, RHS Garden, Wisley, Surrey, TQ062579.

SIMS, I. – *Chrysis viridula* L. (Ruby-tailed wasp) – Specimen recorded from around solitary bee wasp nest burrows, clay bank, Moor Green, Finchampstead, Berks, 1030h, weather sunny and warm, 10.v.2011. New to VC 22.

ODONATA

KNILL-JONES, S. A. – *Erythromma viridulum* (Charpentier), the Small Red-eyed Damselfly, recorded in exhibitor's garden, Totland, Isle of Wight on 8.vii.2013.

Orthoptera

Dickson, R. J. – *Meconema meridionale* (Costa), the Southern Oak Bush-cricket, ♂♂, Fareham SU577070, S. Hampshire (VC11) 8 and 28.x.2013, leg. Keith Wheeler.

Terry, R. – *Ectobius pallidus* (Olivier), the Tawny Cockroach, recorded at a Robinson 125w MV trap, Barnet TQ 258967, Middlesex (VC21) on 27.ix.2013; *Acheta domesticus* (L.), the House Cricket, indoors at Erith Oil Works, Church Manorway, Erith TQ5079 (VC 16) on 12.vii.2012.

Neuroptera

Plant, C. W. – Some lacewings taken at light-traps in south-west Bulgaria during 2013.

Myrmeleontidae: *Myrmecaelurus trigammus* (Pallas), *Neuroleon assimilis* (Navas), *Distoleon tetragrammicus* (F.), Kresna Gorge, Struma Valley, 4.viii.2013, N 41° 45′ 37.64″: E 23° 09′ 18.30″, altitude: 204 metres [670 feet].

Chrysopidae: *Italochrysa italica* (Rossi), Kresna Gorge, Struma Valley, 4.viii.2013, N 41° 45′ 37.64″: E 23° 09′ 18.30″, altitude: 204 metres [670 feet].

Hemerobiidae: *Wesmaelius malladai* (Navas), Orelyek, Pirin Mountains, 8.viii.2013, N 41° 33′ 30.15″: E 23° 37′ 17.64″, at altitude 2064 metres [6700 feet]. *Wesmaelius fassnidgei* (Killington), Rila Mountains, Granchar, 6.viii.2013, N 42° 07′ 18″: E 23° 35′ 39″, altitude: 2180 metres [7100 feet]; *Wesmaelius ravus* (Withycombe), Rila Mountains, Granchar, 6.viii.2013, N 42° 07′ 18″: E 23° 35′ 39″, altitude: 2180 metres [7100 feet]

Other orders
Crustacea: Amphipoda

Dickson, R. J. – *Arcitalitrus dorrieni* (Hunt)(Crustacea: Amphipoda: Talitridae), Fareham SU577070, S. Hampshire (VC11), 27.x.2013, found in damp conditions in a garage, leg. Keith Wheeler. Notes on its history and current status in this country are summarised.

General

Agassiz, D. J. L., Beavan, S. D. & Heckford, R. J. – Coming soon . . . A checklist of the Lepidoptera of the British Isles. This new checklist covers all the UK species including adventives with an appendix of species whose records are either erroneous or cannot be confirmed. Copies are available from the Royal Entomological Society and Field Studies Publications.

Kaunang, J. F. & Collins, G. A. – A display showing the natural history of Warren Farm, Cheam, Surrey. This was an update on the previous year's display, and included photographs illustrating the site (including some from the early 20th century when it was a working farm) and some insects found there.

The threat from the invasive alien plant Canadian goldenrod *Solidago canadensis* is still paramount, although hand-pulling is starting to reduce the plant in parts, but there is also a problem with rank grasses growing in areas where the goldenrod has been reduced. Practical measures to reduce this problem include spreading the seeds of yellow-rattle (*Rhinanthus minor*) harvested from plants already growing on site. The plant is an obligate hemi-parasite of other plants, particularly grasses, from which it obtains nutrients and thus reduces their vigour. The meadows have an

annual cut but, despite being part of the management plan, the site owners consistently refuse to remove the arisings, resulting in the site being covered with several inches of mulch which enriches the soil, suppresses growth of the native chalk flora and helps retain moisture. Currently the only answer is to rake the site manually, an arduous task which falls on a small group of self-motivated individuals unsupported by the site's manager.

Warren Farm is proving to be a successful case for grassland management, and despite these problems the site continues to support insects and plants of calcareous grassland. Species photographed included Small Blue butterfly *Cupido minimus* (Fuessly) (for which Warren Farm is a key site in Surrey), the tephritid *Orellia falcata* (Scopoli), the frog-hopper *Cercopis vulnerata* Illiger, Bee Orchid *Ophrys apifera* and Pyramidal Orchid *Anacamptis pyramidalis*. Most notable was the lace-bug *Catoplatus fabricii* (Stål) (found and photographed by Tristan Bantock) – the first Surrey record for over 50 years.

The exhibitors continue to welcome visitors to the site, both to record and to assist with goldenrod pulling.

BOOK REVIEW

Secret Lives of Ants by Jae Choe. 156 pp. The Johns Hopkins University Press, Baltimore, 2012. ISBN 987654322. Hardback. $31.00.

This book by Korean Professor Jae Choe held in the Society's library at Dinton Pastures is all about the biology and behaviour of ants. Jane Goodall in her foreword describes her time spent studying the community relationships of chimpanzees and her embarrassment at failing to notice the equally complex communities of ants surrounding her on the forest floor below. The book is divided into three sections on the Economics, Culture and Politics of ant society. Chapters range from Ants Mean Business – how the futuristic economies of ants maximise their returns; Talking with Ants – the clever designs of ant communication to War and Slavery – from full-scale slaughter to bloodless warfare. It seems the reality of ant society is more fascinating than even the most creative minds can imagine. Choe combines expert scientific knowledge with a real passion for these miniscule insects. I particularly liked his use of a medical endoscope for investigating the behaviour of ants in their nests. A highly readable book.

JOHN BADMIN

SHORT COMMUNICATIONS

***Chlamydatus saltitans* (Fallén) (Hemiptera: Miridae) new to Watsonian Oxfordshire.** – I recently wrote on the discovery of the rare capsid bug *Chlamydatus evanescens* (Boheman) (Miridae) using a Vax LiFE handheld vacuum cleaner as a suction sampler on derelict land in Oxfordshire and Gloucestershire (Ryan, 2013a). Upon a return visit to one of these sites, a disused airfield at Bradwell Grove, Oxfordshire (National Grid Reference SP248067), on 1.vii.2012, accompanied by the county recorder John Campbell, I made a second noteworthy capture: two specimens of the bug's congener, *Chlamydatus saltitans* (Fallén), which Mr Campbell confirmed as being new to the vice-county of Oxfordshire.

This bug is known to inhabit derelict areas (Woodroffe, 1955; Kirby, 1984) and is reported to feed on low-growing Fabaceae (Papilionaceae) (Southwood & Leston, 1959). My return visit to the site had included sampling the tufts of low plants growing from the gaps between the concrete sections of the runway, in addition to the moss and stonecrop, *Sedum* spp. (Crassulaceae), growing on the concrete itself (which had been the main focus of my first visit), and I assumed that this difference in sampling accounted for the capture of *C. saltitans*. However, a third visit on 15.vii.2012, sampling only the tufts of vegetation, did not produce any more of the bug. A fourth visit on 9.viii.2012, using DragVac, a towed suction sampler (Ryan, 2013b), and directed more at the moss and stonecrop than the other vegetation, did yield another specimen of the insect. On 14.vii.2013, I took several nymphs of the bug at another derelict airfield, near Worminghall, Buckinghamshire (SP638095), using the handheld appliance. This was directed solely at the stonecrop, and the insects were reared on fragments of this plant, becoming adult on days 3, 9 and 10 of the incubation. These observations suggest that stonecrop can serve as a host plant of *C. saltitans*, and that the range of host plant associations with the species is even broader than previously reported.

I am grateful to Mr. Campbell for confirming the status of *C. saltitans*, and for his companionship during my second visit to Bradwell Grove. Some excellent images of the bug can be found on the British Bugs website (*http://www.britishbugs.org.uk*) or by searching Flickr (*http://www.flickr.com*). – R. P. RYAN, 38 St John Street, Oxford, OX1 2LH (email: *RobRyanBugs@gmail.com*).

REFERENCES

Kirby, P. 1984. Heteroptera colonising demolition sites in Derby. *Entomologist's Monthly Magazine* **120**: 253–258.

Ryan, R. P. 2013a. *Chlamydatus evanescens* (Boheman) (Hemiptera: Miridae) – are reports of its rarity greatly exaggerated? *British Journal of Entomology and Natural History* **26**: 105–108.

Ryan, R. P. 2013b. DragVac - another use of a domestic vacuum cleaner as a suction sampler. *British Journal of Entomology and Natural History* **26**: 217–218.

Southwood, T. R. E. & Leston, D. 1959. *The land and water bugs of the British Isles*, Frederick Warne & Co. Ltd, London.

Woodroffe, G. E. 1955. The Hemiptera-Heteroptera of some cinder-covered waste land at Slough, Buckinghamshire. *Entomologist* **88**: 10–17.

A compact, practical system for storing insect specimens. – I was very interested to read the recent articles in this journal on second-hand entomological cabinets (Jones, 2013 & Barrington, 2013), and reflected that relatively little was written on the topic of insect specimen storage, which is at the heart of an entomologist's existence.

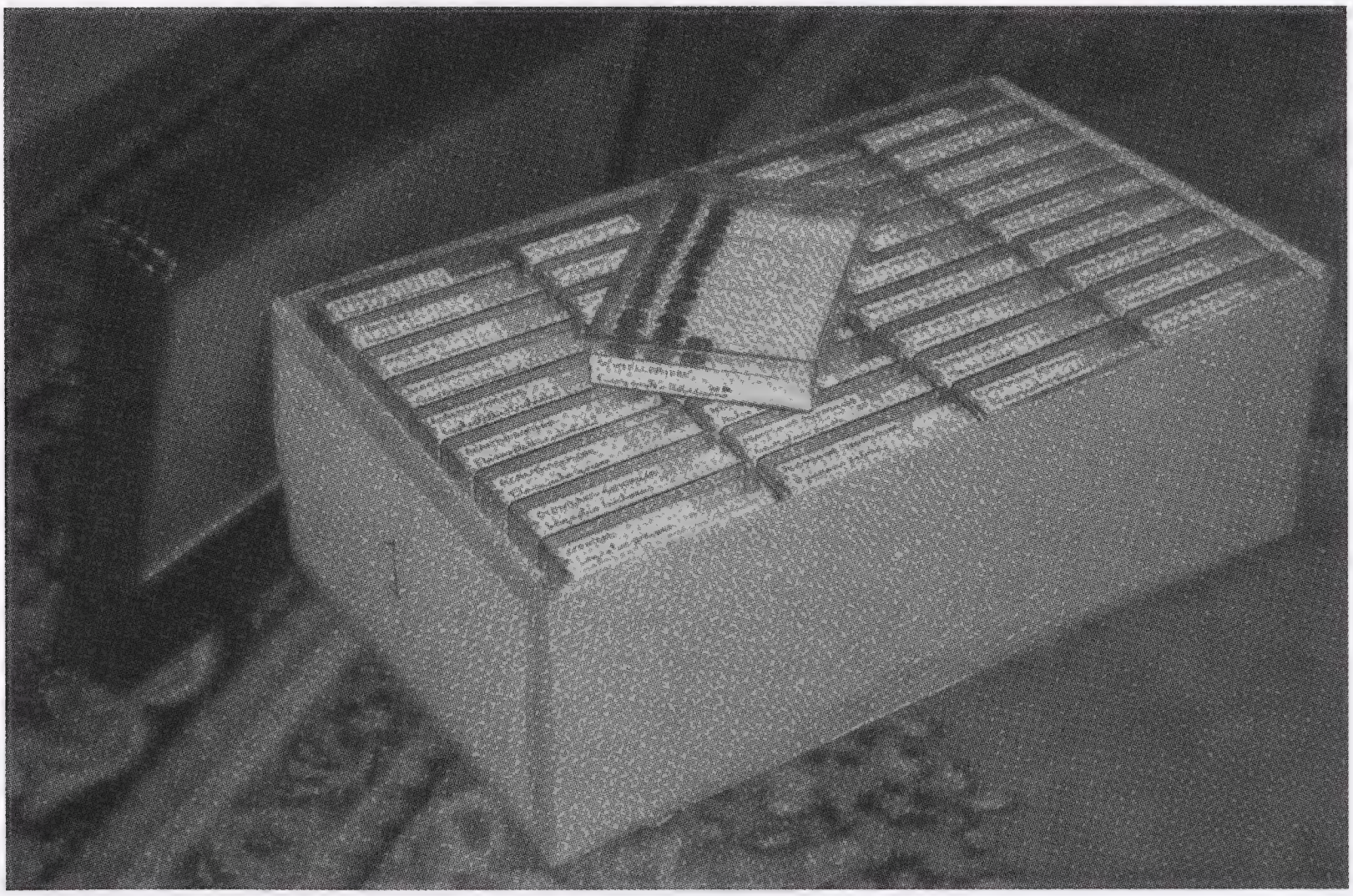


Fig. 1. Shoe box with 36 Plastazote-lined plastic boxes

Entomological cabinets and storage boxes are not the only way to store specimens, and have their disadvantages, yet I could not think of any article I had come across in the national entomological literature describing an alternative.

When I started collecting seriously in 2006, I desired a system that was more compact than an entomological cabinet, but which had the advantages of the 'container system', allowing the addition and reorganisation of specimens, and the transfer to and from the microscope, with little or no re-pinning. The system I came up with, which others no doubt have done independently, was to use small plastic boxes lined with Plastazote. These are just 22mm deep and my specimens are mounted using 15mm headless pins, which allows two or three times as many specimens to be stored for the same volume as in an entomological cabinet. The plastic boxes are labelled with self-adhesive stickers and stored on-end, sticker side up, in shoe boxes, which are themselves housed in an old HiFi cabinet I bought from MFI two decades ago (Figs 1 and 2).

In addition to being compact, the system is very practical. The plastic boxes are insect-proof, but not air-tight, so there is no damaging gush of air as they are opened and closed. Being transparent, the contents of the boxes can be seen without opening, and with dimensions of only 124mm long and 82mm wide they fit easily on the stage of my microscope. Although students of the Odonata and the larger Lepidoptera will find these dimensions insufficient, they are ample for most insects I have collected. I obtain the plastic boxes, Plastazote (6mm) and pins from Watkins & Doncaster, and a trip to the stationers provides me with the modelling knife for cutting the Plastazote, the glue-stick for securing it to the base of the boxes, the self-adhesive labels and the fine-point permanent pen for writing on them. The size 46 Ecco shoes that I regularly wear-out provide the shoe boxes, which are of the perfect dimensions

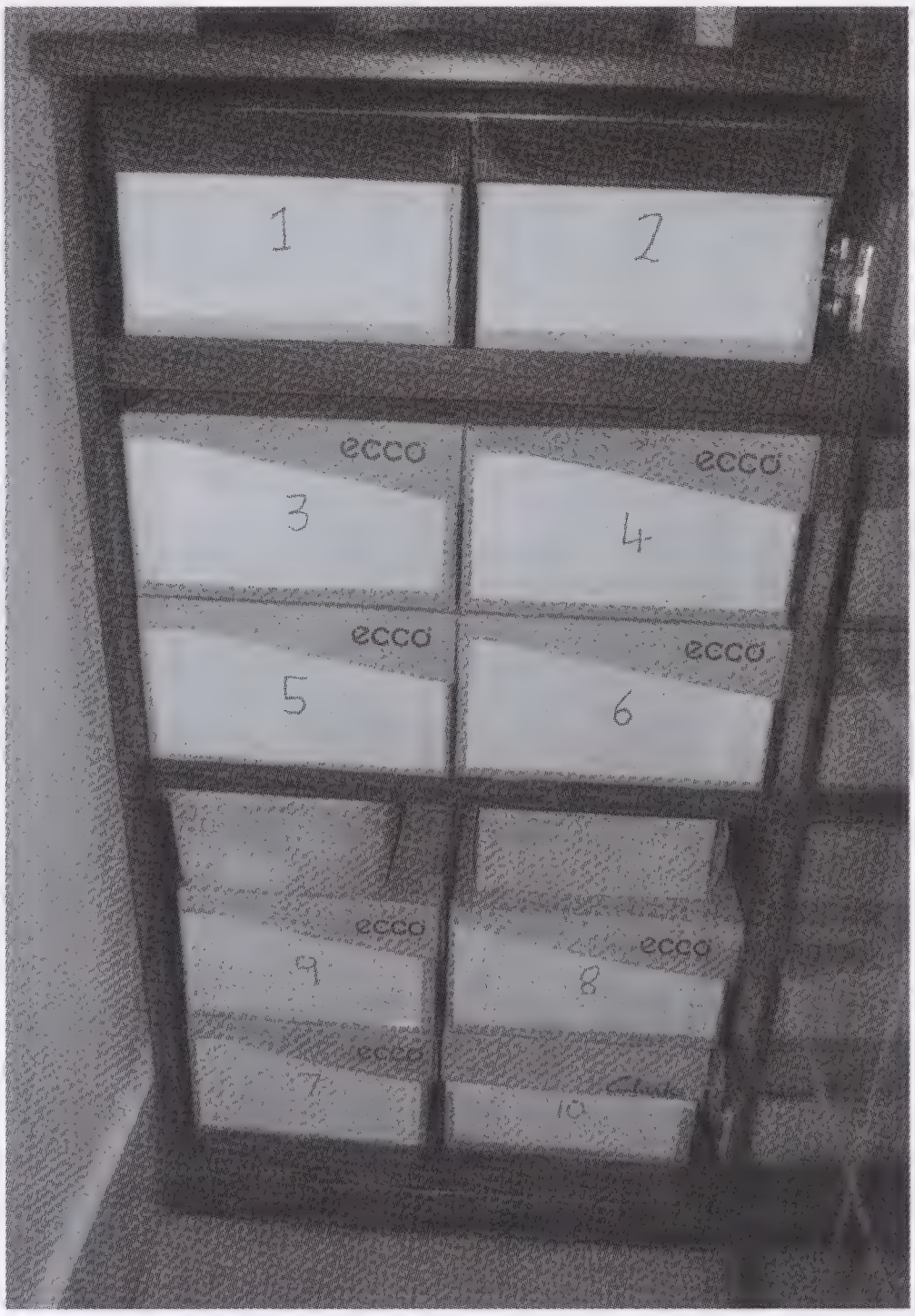


Fig. 2. HiFi cabinet with ten shoe boxes and my insect mounting equipment

both to house 36 plastic boxes (4 rows of 9) and to fit side-by-side on the shelves of the HiFi cabinet.

The principal cost of the system is in the plastic boxes, which I obtain at a discount by buying in bulk (catalogue number E60531). Further savings could be made by shopping around, but given how much I pay each year for petrol, getting to and from the field, it is not my main financial concern! – R. P. RYAN, 38 St John Street, Oxford, OX1 2LH (email: *RobRyanBugs@gmail.com*).

REFERENCES

Barrington, R. 2013. The aura of a cabinet. *British Journal of Entomology and Natural History* **26**: 244.

Jones, R. A. 2013. Cabinets of curiosity. *British Journal of Entomology and Natural History* **26**: 149–155.

Adult *Ledra aurita* (L.) (Hemiptera: Cicadellidae) partially covered by the corticolous green alga *Desmococcus olivaceus*. – Since 1983, a range of trees and herbaceous plants have been sampled every two weeks for leafhoppers and planthoppers in a

long-term monitoring survey of Auchenorrhyncha in Perry Woods, Kent. These results complement a nightly survey of macro-Lepidoptera in the garden on the edge of the woods (now a Local Wildlife Site, whole area formerly chestnut coppice) for the Rothamsted Insect Survey. Annual numbers of our largest leafhopper, *L. aurita* (overall length 13–18 mm), have ranged from 0–4 individuals (nymphs and adults) with an occasional adult in the light-trap, indicating the species is present locally but rather uncommon relative to other leafhoppers.

On 1.viii.1990, an unusually green-coloured, well-camouflaged adult of the leafhopper *L. aurita* was collected from tree foliage in Perry Woods (Plate 6, Fig. 3). This, the largest British leafhopper, is the sole representative of an otherwise tropical subfamily of leafhoppers. Many are known for their highly cryptic appearance blending in with their habit of sitting on the bark of trees.

The specimen collected was send to Dr David John of the Life Sciences Department of the Natural History Museum, London) who kindly identified the green surface covering as the extremely common and widespread corticolous alga *Desmococcus olivaceus* (Persoon ex Acherius) L. R. Laundon (Prasiolales, Chlorophyta). Algal growth extended around the vertex of the head and part of the thorax and was densest around the basal area of the wings, where it was powdery and light green in appearance. Growth of *D.olivaceus* extended from about a third to about half way across each wing from the base. The central region of each wing was more thinly colonised and darker in appearance reflecting the normal colouring of the wing cuticle below (more apparent in the set specimen).

From a human perspective the individual appeared to be much better camouflaged than normal, blending in with algal-covered tree bark where it is known to rest. The big question is how did the adult (or nymph) become so well covered with alga? The most likely explanation is that colonisation by the alga occurred during the adult stage, as it is difficult to imagine how the algal cells could be transferred from nymph to adult during the process of moulting, though a sufficient quantity of cells might just be picked up on the adult's tarsi as it clambered from its exuviae. More likely, *Ledra* simply picked up the alga by walking over algal-covered bark or by probing the bark when attempting to feed and transferring the cells as it groomed itself. Cells of *D. olivaceus* have been observed to divide to produce single cells or 2- or 4-celled packets of cells in 4 days after transfer to water (Y. Tsuki, pers. obs.) so the algal covering might represent a matter of a couple of week's growth or less, well within the lifetime of an adult *L. aurita*. Why *Ledra*? It is possible that algae can establish themselves more easily on insect cuticle than for example on the scale-covered bodies of Lepidoptera, many species of which are known to rest on surfaces where *D. olivaceus* occurs (some simple *in vitro* tests with a range of taxa could confirm this – indeed, do wing scales confer a degree of protection from spore-attachment – or the obverse?). However, no other specimens of *Ledra* that I have seen in collections sport the alga. It is not known whether the presence of the alga was detrimental to the *Ledra* specimen in anyway, for example affecting wing loading or wing beat frequency and so disrupting dispersal or affecting brochosome anointing. – JOHN BADMIN, Coppice Place, Selling, nr Faversham, Kent, ME13 9RP.

OBITUARY

Neville Lawn Birkett fres
1916–2013

Dr Neville Lawn Birkett died in a nursing home in Devon, on 23rd April 2013 aged 96 years. Neville Birkett enjoyed a life-long interest in natural history and particularly entomology. He was one of the foremost Cumbrian entomologists of his generation and a last link with a former generation of late 19th/early 20th century Lakeland entomologists.

Neville was born in Ulverston, Cumbria on 5th November 1916 and attended Ulverston Grammar School. His uncle was William Norman Birkett, the barrister, judge and politician who served as a British judge during the Nuremberg Trials and later became the first Lord Birkett of Ulverston. Neville's first published contribution to the study of entomology came when as a schoolboy in 1932, he published in the *Entomologist* on the occurrence of the Bordered Straw moth (*Heliothis peltigera*) in Ulverston. Over the next seven decades he published over 150 different notes and articles in numerous entomological and natural history journals. During the 1940s he published regularly on the Lepidoptera of the Furness and Kendal districts. At this time he got to know the older generation of local entomologists such as Albert Wright in Grange-over-Sands and Frank Littlewood and Charles Lowther in the Kendal area. With their passing around 1950, Neville inherited their natural history diaries, archives and some of their historical specimens, including specialities such as the now extinct race of the Silver-studded Blue *Plebejus argus* ssp. *masseyi* that once occurred on the Morecambe Bay mosses. He published frequent references to historical data from this archive himself as well as making it freely available to others.

After studying medicine at Emmanuel College, Cambridge, Neville trained at St Bartholomew's Hospital in London. After the war he moved back to his home county, where he worked as a General Practitioner in Kendal for nearly 30 years, living first in the centre of that town and later at nearby New Hutton. The name of

his house at New Hutton – 'Kendal Wood' – appears on many data labels for insects in his collection that were caught in his garden over the years. Neville became active in the Kendal Natural History Society and was elected Chairman of the Society for many years. At this time he also became Secretary of the Meathop Moss Nature Reserve Committee, one of the first reserves created by Rothchild's Society for the Promotion of Nature Reserves. He was also an active member of the regional entomological societies – the Lancashire & Cheshire Entomological Society and the Raven Entomological Society. He became involved in studies on the rare Netted Carpet moth *Eustroma reticulatum* in south Cumbria and in 1951 published a short history of the species. His field work was often in conjunction with other local entomologists such as John Heath, then at the Nature Conservancy's Merlewood Research Station, Grange over Sands; Canon GAK Hervey, lepidopterist and founder of the Lakeland Naturalists' Trust – now Cumbria Wildlife Trust; Dr Charles J. Goodall of Bolton-le-Sands, a keen collector and also a GP; and light-trapping with Bill Kidd and Ted Hancock of Ulverston. During the 1950s and 60s, he published many contributions on insects in local natural history journals such as the *Field Naturalist* and in 1970 he wrote the chapter on insects for *The Natural History of the Lake District* published by Frederick Warne. Neville was also active in national societies such as the Royal Entomological Society, of which he was a fellow, and the British Entomological and Natural History Society and regularly attended their meetings. He continued to publish regularly in the national literature - in 1954 he published an account of the butterflies of south Cumbria in the *Entomologist Monthly Magazine*, drawing on his own experience and the historical archive in his possession. In 1959 he joined the editorial panel of the *Entomologist's Record and Journal of Variation*, a role which he fulfilled for the next 30 years.

Even family holidays involved the pursuit of his passion for entomology and trips to Spain, Yugoslavia, Italy, the Alps and the Pyrenees provided opportunity to collect interesting species of Lepidoptera. Perhaps as a result of his published notes on some of these travels, he got to know W.B.L. Manley and a number of Manley specimens are present in the Birkett collection of European butterflies.

Neville's interest in Diptera was perhaps first sparked when he found the spectacular hoverfly *Doros profuges* at the edge of Eggerslack Wood, Grange-over-Sands in 1947. He gave the specimen to Albert Wright and Neville remains the last person to see this rare fly (now a UK Biodiversity Action Plan species) in Cumbria. He became more and more interested in the flies, as well as the moths, that were attracted to his light-trap, and in 1951, at the suggestion of Harry Britten, began to collect and study Chironomidae – a group of flies in which he was to become a nationally recognised expert. In 1957 he published his first note on chironomids in the *Entomologist's Monthly Magazine* and continued to publish on this group both locally and nationally over the next three decades. In 1960 he added the midge *Pseudodiamesa nivosa* new to Britain from specimens collected from the summit of Braeriach, Inverness-shire by E. C. Pelham Clinton in 1955. In 1976 he added *Cricotopus polaris* to the British list from specimens collected on Moor House NNR, Cumbria by D. T. Crisp in 1962/63. Also in 1976, Neville discovered *Tanytarsus gracilentus* new to Britain at Leighton Moss, Lancashire and in 1984 he added *Dicrotendipes pallidicornis* new to Britain from Sandscale Haws, Cumbria. His interest in Diptera broadened and developed to match his fondness for Lepidoptera and he amassed a significant collection of Diptera from south Cumbria. He also collected other insect orders and in 1985 he recorded the rhopalid bug *Chorosoma schillingi* new to Cumbria – an early Cumbrian example of an insect species expanding its range northwards.

Neville Birkett became a key source of information on the Lepidoptera and Diptera of Cumbria. He produced a manuscript account of the Lepidoptera of Westmorland – later expanded to cover all of Cumbria after the creation of the county in 1974. He also maintained card indexes of all Lepidoptera and Diptera records for Cumbria.

Neville took early retirement in 1976 after undergoing heart surgery. With his wife, the late Joy Birkett, He moved to Grange-over-Sands and latterly to Arnside, before moving down to Devon in 2008.

I first got to know Neville in 1991. His friendly interest and encouragement was much appreciated and I greatly enjoyed visiting Neville and Joy at their home in Grange where I was always made most welcome. Neville had more or less given up active fieldwork by this time due to arthritis, although he still ran a moth trap at his house and he continued to work on the large insect collections that he had developed over the course of 60 years of collecting. He joined Carlisle Natural History Society in the 1990s and published several notes in the *Carlisle Naturalist* at that time.

Neville donated his entomology collections of over 20,000 specimens and historical archive of Cumbrian entomological diaries, notebooks and record cards to Tullie House Museum, Carlisle in 2004 when failing eyesight prevented him from using his microscope. His collection of Chironomidae went to the Liverpool Museum at the same time. Despite increasing ailments, Neville was always cheerful and invariably humorous. He was always interested in the studies of other naturalists and generous with helpful information from his long experience and collated records.

Neville's other interests included golf, music, fishing and walking in the Lake District. Throughout his career he had been actively connected with the St John Ambulance Brigade and became county surgeon for the Order. He was appointed a Justice of the Peace in 1965 and served as a Deputy Chairman of the Kendal Bench. He is survived by his three children, Hilary, Peter and Anne and his grandsons.

My thanks to Hilary Shaer and Geoff Hancock for information and comments on a draft of this account.

STEVE HEWITT

N. L. BIRKETT PUBLICATIONS

1932 *Heliothis peltigera* in Lancashire. *Entomologist* **65**: 65.
1940 Stridulation in *Nymphalis Io*. *Entomologist* **73**: 33.
1940 Unusual behaviour of *Lysandra coridon*. *Entomologist* **73**: 234–235.
1941 A probable migration of *Pieris brassicae*. *Entomologist* **74**: 64
1942 A list of the Lepidoptera of Ulverston and District. *North Western Naturalist* **17**: 357–362.
1942 *Argyresthia spiniella* Zell. in Hertfordshire. *Entomologist* **75**: 68.
1943 *Coleophora spissicornis* in North Lancashire. *Entomologist* **76**: 239.
1943 Food of Earwigs. *Entomologist* **76**: 213–214.
1945 "King George" Butterfly. *Entomologist's Record & Journal of Variation* **57**: 106–107.
1946 A late record of *Pieris rapae* L., in North Lancashire. *Entomologist's Record & Journal of Variation* **58**: 23.
1946 A teratological male *Chimabache fagella* Fabr. *Entomologist* **79**: 219.
1947 Observations on *Drepana binaria* in North Lancashire. *Entomologist* **80**: 161–64.
1949 Meathop Moss Nature Reserve. *Entomologist's Record & Journal of Variation* **61**: 29.
1949 Meathop Moss Nature Reserve. *Entomologist* **82**: 92–93.
1950 Albert Edward Wright: an obituary. *Entomologist* **83**: 167–168.
1950 Richard Charles Lowther, (1884–1950): an obituary. *North Western Naturalist* **1**: 300.
1951 A short history of *Eustroma reticulata* Schiff. *Raven Entomological and Natural History Society Annual Report*, **1950**: 37–39.
1951 It happened at . . . ghosts. *Entomologist's Gazette* **2**: 82.
1951 Some Lepidoptera records from Tenby, 1951. *Entomologist's Record & Journal of Variation* **63**: 242–244.

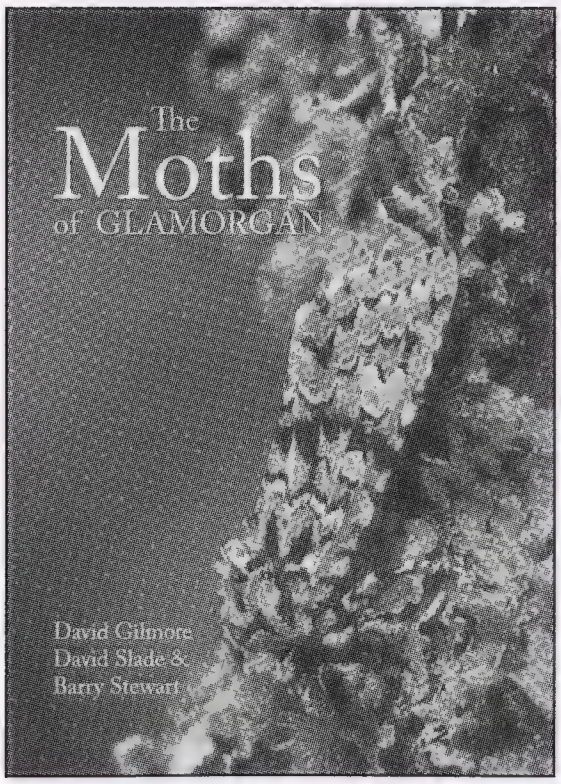
1951 Some notes from South Westmorland, 1950. *Entomologist* **84**: 34–35.
1951 Variety of *Euclidimera mi* Clerck. *Entomologist's Record & Journal of Variation* **63**: 246.
1952 Autumn collecting notes from the Kendal District, 1951. *Entomologist's Record & Journal of Variation* **64**: 109–111.
1952 Beetle impaled on Sea Holly. *Entomologist* **85**: 111.
1952 Early occurrence of immigrants in 1952. *Entomologist's Record & Journal of Variation* **64**: 122.
1952 Moths and Wasps. *Entomologist's Record & Journal of Variation* **64**: 242–243.
1952 *Ordontosia carmelita* in South Westmorland and North Lancashire. *Entomologist* **85**: 190–191.
1952 Some Microlepidoptera Records from the North-West. *Entomologist's Record & Journal of Variation* **64**: 82–84.
1953 Additions to the List of Lepidoptera at Ulverston. *North Western Naturalist* **1**: 293–294.
1953 Albert Edward Wright (1873 - 1950): an Obituary. *North Western Naturalist* **1**: 300–301.
1953 Lepidoptera collecting notes, 1952. *Entomologist's Record & Journal of Variation* **65**: 6–10.
1954 A note on *Nomophila noctuella*, Schiff. *Entomologist's Record & Journal of Variation* **66**: 173–174.
1954 Lepidoptera collecting notes, 1953. *Entomologist's Record & Journal of Variation* **66**: 110–114.
1954 Some Cardiganshire Lepidoptera Records, 1954. *Entomologist's Record & Journal of Variation* **66**: 244–245.
1954 The occurrence of *Eurois occulta* L. in Westmorland and Penrith. *Entomologist's Record & Journal of Variation* **66**: 240–241.
1954 The present status of the Butterfly population of the Kendal District, Westmorland. *Entomologist's Monthly Magazine* **90**: 293–298.
1955 A Note from Westmorland. *Entomologist's Record & Journal of Variation* **67**: 208.
1955 Current Notes: When is a species not a species? *Entomologist's Record & Journal of Variation* **67**: 296.
1955 *Phalonia implicitana* Wocke in North Lancashire. *Entomologist's Record & Journal of Variation* **67**: 331.
1956 Abundance of *Erebia aethiops* Esp. in South Westmorland. *Entomologist's Record & Journal of Variation* **68**: 79.
1956 *Acherontia atropos* L. at Kendal. *Entomologist's Record & Journal of Variation* **68**: 225.
1956 Another note on *Calophasia lunula* Hufn. *Entomologist's Record & Journal of Variation* **68**: 273–274.
1956 An 'overlooked' foodplant of *Exapate congelatella* Clerck. *Entomologist's Record & Journal of Variation* **68**: 310.
1956 *Hydraecia oculea* L. and its near relatives in North-West England. *Entomologist* **89**: 20–21.
1956 *Psilothrix cyaneus* Ol. (Col., Dasytidae) in Lancashire. *Entomologist's Monthly Magazine* **92**: 236.
1956 Second broods and immigrants, 1955. *Entomologist's Record & Journal of Variation* **68**: 79–80.
1956 Some observations on a flight of *Bombus lucorum* L. (Hym., Bombidae). *Entomologist's Monthly Magazine* **92**: 333.
1957 *Coelopa* Swarms. *The Field Naturalist* **2**: 4.
1957 *Dryophilus pusillus* (Gyll.) (Col., Anobiidae) in a light trap. *Entomologist's Monthly Magazine* **93**: 240.
1957 Early immigrants at Kendal, Westmorland. *Entomologist's Record & Journal of Variation* **69**: 118.
1957 More notes on Suffolk Lepidoptera. *Transactions of the Suffolk Naturalists' Society* **10**: 1–4.
1957 The Chironomidae. *The Field Naturalist*. **2**: 21-22.
1957 Notes on a small collection of Chironomidae (Diptera) made in the Kendal District. *Entomologist's Monthly Magazine* **93**: 145–149.
1957 Notes on the 1956 season. *Entomologist's Record & Journal of Variation* **69**: 1–6.
1957 Rowan berries attracting Moths. *Entomologist's Record & Journal of Variation* **69**: 75.
1957 A review of the status of some Lake District Lepidoptera. *The Changing Scene* **1**: 40–46.
1958 *Aegeria spheciformis* Schiff at Witherslack, Westmorland. *Entomologist's Record & Journal of Variation* **70**: 222.
1958 A short holiday trip to Spain,1958. *Entomologist's Record & Journal of Variation* **70**: 259–262.

1958 *Leucania straminea* and *Triphaena interjecta* in North Lancashire. *Entomologist* **91**: 252.
1958 Notes on immigrant Lepidoptera to North-West England. *Entomologist's Record & Journal of Variation* **70**: 274–275.
1958 On the biology of the Chironomidae. *Annual Report and Proceedings Lancashire and Cheshire Entomological Society*, **1957–58**: 39–48.
1959 Some records of Hover-flies (Dipt., Syrphidae) at Mercury-Vapour Light. *Entomologist's Monthly Magazine* **95**: 63.
1959 Two records of Cerambycidae (Col.) from North Lancashire. *Entomologist's Monthly Magazine* **94**: 181.
1959 What at Witherslack? *Entomologist's Record & Journal of Variation* **71**: 197–201.
1960 *Gonodontis bidentata* var. *nigra* Prout in Westmorland. *Entomologist's Record & Journal of Variation* **72**: 195.
1960 *Herse convolvuli* L. at Kendal, Westmorland. *Entomologist's Record & Journal of Variation* **72**: 197.
1960 Some records of Scottish Chironomidae, (Diptera: Nematocera). *Entomologist* **103**: 237–240.
1960 Lepidoptera of the Moss-lands of Southern Lakeland. *The Changing Scene* **2**, 48–53.
1960 *Servillia ursina* Meig (Dipt., Tachinidae) in South Westmorland. *Entomologist's Monthly Magazine* **96**: 21.
1960 Some records of Chironomidae (Diptera) taken in Scotland. *Entomologist* **93**: 182–183.
1960 Some records of Lepidoptera from the North West, 1959. *Entomologist's Record & Journal of Variation* **72**: 65–67.
1960 Winter Chironomidae (Dipt.) in the Lake District. *Entomologist's Record & Journal of Variation* **72**: 132–133.
1961 An Entomological mystery. *Entomologist's Record & Journal of Variation* **73**: 134.
1961 An Entomological mystery – a further note. *Entomologist's Record & Journal of Variation* **73**: 263.
1961 Collecting notes, 1961. *Entomologist's Record & Journal of Variation* **74**: 13–18.
1961 *Pyrausta asinalis* Hubn. at Penmaenmawr. *Entomologist's Record & Journal of Variation* **73**: 134.
1962 *Tettigonia viridissima* L. (Orth., Tettigoniidae) in Pembrokeshire. *Entomologist's Monthly Magazine* **68**: 202.
1963 Some records of *Blastobasis lignea* Wals. *Entomologist's Record & Journal of Variation* **75**: 148.
1963 Unusual abundance of *Odontosia carmelita* Esp. in Westmorland. *Entomologist's Record & Journal of Variation* **75**: 175.
1963 Why collect Butterflies and Moths? *The Field Naturalist*. **8**: 1–4.
1964 A Continental Holiday, 1963. *Entomologist's Record & Journal of Variation* **76**: 102–106 & 126–129.
1964 A scale defect in *Lysandra bellargus* Rott. *Entomologist's Record & Journal of Variation* **76**: 236.
1964 A visit to Yugoslavia, 1964. *Entomologist's Record & Journal of Variation* **76**: 279-282.
1964 *Pyrochroa coccinea* (L.) (Col., Pyrochroidae) in Westmorland. *Entomologist* **97**: 249.
1965 An intersex of *Pyrophaena granditarsa* (Forster) (Diptera: Syrphidae). *Entomologist* **98**: 1.
1966 A Scale Defect in *Lysandra bellargus* Rott. *Entomologist's Record & Journal of Variation* **76**: 236.
1966 A Scale Defect in *Pieris napi*. L. *Entomologist's Record & Journal of Variation* **78**: 13.
1966 Further records of Cardiganshire Lepidoptera, 1965. *Entomologist's Record & Journal of Variation* **78**: 11–13.
1966 Notes on the distribution of *Plusia festucae* L. and *P. gracilis* Lempke mainly in North-West England. *Entomologist's Record & Journal of Variation* **78**: 283–285.
1970 A late Pierid in Westmorland. *Entomologist's Record & Journal of Variation* **82**: 30.
1970 *Cataclysta lemnata* L. in South Westmorland. *Entomologist's Record & Journal of Variation* **82**: 30.
1970 *Echinomyia grossa* (L). (Dipt., Tachinidae) in North Lancashire. *Entomologist's Monthly Magazine* **106**: 179.

1970 Insects. pp 117–137 in Hervey, G.A.K. & Barnes, J.A.G. (eds.) *Natural History of the Lake* District. London. Warne.
1971 *Drepanepteryx phalaenoides* (Linn.) (Neuroptera: Hemerobiidae) in Westmorland. *Entomologist* **104**: 28.
1971 *Eristalis abusivus* Collin (Diptera: Syrphidae): A belated record. *Entomologist* **104**: 32.
1971 *Loxostege sticticalis* L. in Westmorland. *Entomologist's Record & Journal of Variation* **83**: 25.
1971 *Ornithomyia fringillina* Curtis (Dipt., Hippoboscidae) in Westmorland. *Entomologist's Monthly Magazine* **107**: 26.
1972 *Eurois occulta* L. in South Westmorland. *Entomologist's Record & Journal of Variation* **84**: 250–251.
1973 An immigration of the Diamond-back Moth? *Entomologist's Record & Journal of Variation* **85**: 227–228.
1973 More inland records of *Necrodes littoralis* (L.) (Col., Silphidae). *Entomologist's Monthly Magazine* **109**: 190.
1973 On the derivation of the family name Chironomidae (Diptera). *Entomologist's Gazette* **24**: 26.
1974 Some records of migrant Lepidoptera in Westmorland. *Entomologist's Record & Journal of Variation* **86**: 95.
1975 Some notes on *Thera juniperata* (L.) (Lep., Geometridae) in North-West England. *Entomologist's Record & Journal of Variation* **87**: 21–22.
1976 Chironomidae (Diptera: Nematocera) from Leighton Moss, including a species new to Britain. *Entomologist's Gazette* **27**: 245–254.
1976 Chironomidae (Diptera) trapped in a Pennine Stream, including two species new to Britain. *Entomologist's Gazette* **27**: 161–170.
1976 Non-Biting Midges. *Natural History in Cumbria,* 1975–76: 81–85. Association of the Cumbria Natural History Society.
1976 Witherslack district, Cumbria, Field Meeting, 28th–29th June, 1975. *Proceedings of the British Entomological and Natural History Society* **8**: 121–122.
1976 *Xanthia citrago* (L.), in West Ross (V.C.105). *Entomologist's Record & Journal of Variation* **88**: 266.
1977 Some Records of Migrant Lepidoptera in South Cumbria in 1976. *Entomologist's Record & Journal of Variation* **89**: 152–153.
1978 Further observations of scale defects in Rhopalocera. *Entomologist's Monthly Magazine* **114**: 223–225.
1979 *Xylocopa violacea* (L.), (Hym., Xylocopidae) – a further British record. *Entomologist's Monthly Magazine* **115**: 96.
1980 *Agrotis puta* Huebner in Cumbria. *Entomologist's Record & Journal of Variation* **92**: 8.
1980 Foodplants of *Tyria jacobaeae* L. (Cinnabar). *Entomologist's Record & Journal of Variation* **92**: 25.
1980 *Lasiopogon cinctus* (Fab), (Dipt., Asilidae) in South Cumbria. *Entomologist's Record & Journal of Variation* **92**: 50.
1980 Relaxing insects. *Entomologist's Record & Journal of Variation* **92**: 227.
1981 Some records of *Sphaerophoria* (Dipt., Syrphidae) from North West England. *Entomologist's Record & Journal of Variation* **93**: 81–82.
1982 A feeding habit of *Brachyopa scutellaris* (Desvoidy) (Dipt., Syrphidae). *Entomologist's Record & Journal of Variation* **94**: 206.
1982 *Alophora S.S. hemiptera* (Fab.) (Dipt., Tachinidae) in VC 69. *Entomologist's Record & Journal of Variation* **94**: 133.
1982 *Tropidia scita* (Harris) (Dipt., Syrphidae) in VC 69. *Entomologist's Record & Journal of Variation* **94**: 162.
1984 *Anasimyia contracta* Torp & Claussen,1980. (Dipt., Syrphidae) in North Lancashire. *Entomologist's Record & Journal of Variation* **96**: 68.
1984 *Phryno vetula* (Mg) (Dipt., Tachinidae) new to Cumbria, VC 69. *Entomologist's Monthly Magazine* **120**: 32.
1984 Some unusual brackish water Chironomids (Diptera) from Cumbria. *Entomologist's Gazette* **35**: 197–198.

1987 A further note on the Purple Hairstreak (*Quercusia quercus* (Linn)) *Bulletin of the Amateur Entomologist's Society* **46**: 94.
1987 *Pseudatemelia josephinae* Toll. (Lep. Oecophoridae) in Cumbria. *Entomologist's Record & Journal of Variation* **99**: 231–232.
1989 A record of *Sphegina elegans* (Schummel, 1843) (=kimakowiczi) (Diptera: Syrphidae) in Cumbria. (VC 69). *Dipterists Digest* **2**: 35.
1989 Another record of *Brachypalpus laphriformis* (Fallen), (Dipt., Syrphidae). *Entomologist's Record & Journal of Variation* **101**: 59–60.
1989 Further records of brackish water chironomids (Diptera) from Cumbria. *Entomologist's Gazette* **40**: 13.
1990 *Anomoia purmunda* (Harris,1780) (Diptera: Tephritidae) in South Cumbria. (VC 69). *Dipterists Digest* **3**: 7.
1990 Dates of emergence of *Abraxas grossulariata* (Linnaeus), (Lep., Geometridae) in South Cumbria. *Entomologist's Record & Journal of Variation* **102**: 144–145.
1990 *Eucosmomorpha albersana* (Hubner), (Lep., Tortricidae) in VC 60. *Entomologist's Record & Journal of Variation* **102**: 46.
1990 *Platypalpus longicornis* (Meig) (Dipt., Empididae) preying on *Bombus lapidarius* (L.) (Hym., Aculeata). *Entomologist's Monthly Magazine* **126**: 118.
1990 Polyandry in *Merodon equestris* (Fab.) (Syrphidae). *Dipterists Digest* **6**: 6.
1991 A note on *Dioctria oelandica* (Linnaeus) (Diptera: Asilidae). *Dipterists Digest* **8**: 13.
1991 Jeremiah (Jerry) Briggs, 1904-1991. *Entomologist's Record & Journal of Variation* **103**: 165–166.
1991 Records of three uncommon Diptera in 'Westmorland' (VC 69). *Dipterists Digest* **8**: 14.
1993 *Cydia compositella* (Fab), (Lep., Tortricidae) in VC 69, Westmorland. *Entomologist's Record & Journal of Variation* **105**: 44.
1994 *Acronicta tridens* (Schiff), (Lep., Noctuidae) in South Cumbria. *Entomologist's Record & Journal of Variation* **106**: 256.
1994 The Lowther diaries. *Antenna* **18**: 105.
1996 *Chrysotus concinnus* (Diptera: Dolichopodidae) in North Lancashire. *Dipterists Digest* **2**: 89.
1996 *Euproctis similis* (Fuess), (Lep., Lymantriidae) double-brooded. *Entomologist's Record & Journal of Variation* **108**: 132.
1996 Some memories of an Old Corvus. In: Underwood, Richard. (ed.) *The Raven Entomological and Natural History Society 50 years 1946–1966*: 144–151. Published by the Society.
1997 A further note on the 14-spot Ladybird (*Propylea* 14-*punctata* (L).) *Carlisle Naturalist* **5**: 7.
1997 Some records of Coccinellidae (Coleoptera) attracted to Mercury vapour light. *Entomologist's Record & Journal of Variation* **109**: 125.
1999 *Pammene gallicana* (Guenee, 1845) (Lepidoptera: Tortricidae) new to VC 69 (Westmorland). *Carlisle Naturalist* **7**: 28-29.
1999 Notes on the Clay triple-lines (*Cyclophora linearia* (Hubn.)) (Lepidoptera: Geometridae). *Carlisle Naturalist* **7**: 29.
1999 Some records of Lepidoptera from Westmorland. *Entomologist's Record & Journal of Variation* **111**: 203-204.
2000 *Chrysotoxum cautum* (Harris) (Diptera, Syrphidae) in North Lancashire (VC 69). *Dipterists Digest* **7**: 4.
2000 Two uncommon immigrants to Westmorland (VC 69). *Entomologist's Record & Journal of Variation* **112**: 252.
2001 The plume moth *Stenoptilia millieridactyla* (Braund) in VC 69 (Westmorland). *Carlisle Naturalist* **9**: 3–4.
2001 Some records of immigrant Lepidoptera in Westmorland(VC 69). *Carlisle Naturalist* **9**: 5–7.
2001 Some notes on the occurrence of Blair's Shoulder-knot (*Lithophane leautieri* (Boisd.)) in Cumbria. *Carlisle Naturalist* **9**: 30–32.
2001 The Orange Ladybird *Halyzia sedecimguttata* a migrant? (L) (Col., Coccinellidae). *Entomologist's Record & Journal of Variation* **113**: 34–35.
2002 A note on *Helicoverpa armigera* (Hb) (Lep., Noctuidae) in Cumbria. *Entomologist's Record & Journal of Variation* **114**: 154.

BOOK REVIEWS



The Moths of Glamorgan by David Gilmore, David Slade, and Barry Stewart. 424pp, 32 colour plates. Atropos Publishing, Cornwall, 2014. Hardback. ISBN 978-9551086-3-12. £40.00 available from Atropos Books (http://www. atroposbooks. co.uk/publications) or direct from the authors (http://gmrg-vc41moths. blogspot.co.uk/ in which case cheques payable to Glamorgan Moth Recording Group and add £4.50 for p&p).

This volume is a product of the national upsurge in moth recording which began in the 1990s, partly driven by bird watchers switching their attention to these insects, as evidenced in the foreword by Steve Moon who was President of the Glamorgan Moth Recording Group (GMRG) for its first ten years after its foundation in 1995. Thanks to the activities of that group this book places on record the results of the hard work of the group members in recording both macro and micro moths, making it now one of the best recorded counties in the British Isles with around 1,500 species listed.

The recording unit taken is that of the county of Glamorgan as defined by the Watsonian vice county boundaries (VC 41) of 1853 which is roughly bounded by Cardiff in the east, Swansea in the west and Merthyr to the north. Chapters cover the history of moth recording in the county, the geology of Glamorgan, the types of moth habitats present (with characteristic species) and a separate listing of the species occurring which have been assigned a national category reflecting scarcity or threatened status (e.g. Red Data Book and Nationally Notable species).

The chapter on history summarises what is known of entomologists working in the county from the early 19th century and mentions the previous county lists published in 1917 and 1936 and the presence of the noted lepidopterist Basil McNulty between 1983 and 1994. Personally I would have liked to have seen more detail about the current wave of moth recording, the authors for example have rightly acknowledged the assistance of the National Museum Wales but have been very modest in not explaining their own level of knowledge and expertise which is of the highest order.

The longest introductory chapter is actually the excellent overview of the geology contributed by Steve Howe. I was left wishing that more had also been written on the moth habitats and the particular stories relating to specific species both extinct and extant in the introductory chapters e.g. The Conformist *Lithophane furcifera* spp. *suffusa* (known from 1859 to 1959) or the recent colonisation by species such as the Cypress Pug *Eupithecia phoeniceata*.

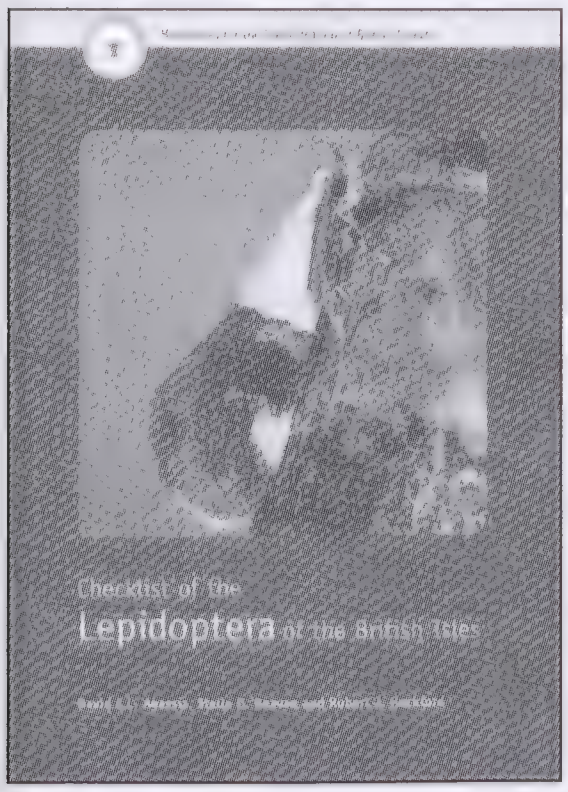
The main bulk of the book is of course taken up by the systematic list, presumably one of the last such publications to use the very familiar Bradley checklist (given the recent publication of the revised checklist by Agassiz, Beavon & Heckford), a bonus to those who have grown up on that list and are familiar with the order of species. Each species is covered by a summary of its status and a brief statement of interesting facts such as larval foodplant, changing abundance, places of occurrence and the like. The stories around species such as The Conformist are here but in brief and would have benefited from being drawn out further elsewhere. Over 200 distribution maps and phenology charts are provided for selected macros, in other words around one third of the macro species listed. The information supplied is based on a very

impressive 350,000 records now held on the county database. Appendices list those species rejected as having been recorded erroneously, adventive species and species added to the county list since 31 December 2009 (the date up to which the main list covers). A comprehensive list of references is very welcome, as is the gazetteer.

The colour plates are together in one block, presumably to keep printing costs within limits, although single colour has been used throughout for the distribution maps. The photographs themselves are of the highest standard as one might expect given the photographers credited. I particularly admired the habitat photographs, it is surprisingly difficult to illustrate key and interesting features of woodland and fen for example without it just looking like a sea of green, here they succeed admirably. With the internet and books awash with good photos of the British adult moth fauna perhaps more county atlases could follow this example and demonstrate the places where we can find these species and convey a real feel for the landscape of the county in question. Larval and pupal photos are an additional delight.

In summary, this is a splendid addition to the genre of county moth atlases and is a great credit to the authors and to all those who have submitted records to the GMRG. No one should ever underestimate the tremendous amount of effort it takes to collect, research, collate and summarise information on 1,500 species with records dating back 200 years, especially when it comes to including the micro-moth fauna with its historic taxonomic pitfalls. Any criticisms above are minor and do not detract from the success of the main aim of the book to establish a published base-line data set which will be referred to constantly by local recorders for many years to come, providing an extremely useful way to assess the significance of their own captures. As always, populations will change and new species will be discovered, it is to be hoped that having this book available will stimulate yet more to become moth recorders and continue this invaluable study.

RAY BARNETT



Checklist of the Lepidoptera of the British Isles edited by David J. L. Agassiz, Stella D. Beavan and Robert J. Heckford. 206 pp. Handbooks for the Identification of British Insects, Volume 12 Part 6, published for the Royal Entomological Society by the Field Studies Council, 2013. Soft back £25.00. ISBN98-0-901546-96-8.

The review copy of this book arrived a week before Christmas 2013 just in time to check the names of the Lepidoptera species shown at the Society's annual exhibition the month before. It is a marvellously easy book to use and a worthy successor to Bradley (2000), the lepidopterist's previous Bible. The editors have wisely consulted widely, with contributions from mainland continental taxonomists as well as from British lepidopterists Harry Beaumont, Richard Dickson, Brian Elliott, Colin Hart, Barry Henwood, John Langmaid, Jim Reid, Tony Simpson, Ian Sims, Gerry Tremewan and Mark Young who know the British fauna well.

In the Foreword, Malcolm Scoble, former Keeper of Entomology at the Natural History Museum explains succinctly why we need a new Lepidoptera checklist and I quote 'There are two main reasons. The first of these is to add the names of species that have been found in Britain for the first time – i.e. new records. . . . the second reason is more complex, namely to reflect changes made by the process of taxonomic

revision – this type of research being more dynamic than often is appreciated. Revisionary taxonomy involves processes such as discovering that what was thought to be two species is considered to be just one (synonymy), or the obverse where one species is a complex of two species or more.

The lay-out of the Checklist with its various columns is explained at the beginning of the checklist. The verified name of each species is usually in agreement with the Fauna Europaea list, and the sequence of families and genera follows that classification, updated in certain respects (see Sohn *et al.*, 2013). This seems a sensible balance, to explain competing phylogenies would be to open Pandora's box.

The numbering of species has a long history dating back to Heslop (1947) and today its use is even more prevalent and important as additional information on species is stored in computerised relational databases. Modification of Bradley's existing species numbers with suffixes to reflect modern taxonomy proved insurmountable and so the editors have taken the bold decision to introduce an entirely new numbering system: each species being given a number following the family number. Thus the first species, *Micropteryx tunbergella* (F.) is numbered 1.001 and the 'last species' in the list, the nolid *Earias insulana* (Boisduval) is numbered 74.012. From this you can neatly deduce there are 74 families of Lepidoptera found in Britain. Vernacular names, such as the Egyptian Bollworm for *E. insulana* are included and a certain amount of realism has crept in as for example *Spodoptera littoralis* (Boisduval) is listed by its universally accepted name of African Cotton Leafworm as well as by its more parochial but wonderfully evocative British name of Mediterranean Brocade. For those who have had the experience of trying to control this cotton pest in the field there are other names. The Bradley number and species synonyms are included for cross reference. The very first species is a case in point: in 1787 Fabricius presumably intended to name the *Micropteryx* species after his colleague Carl Peter Thunberg, but realising a spelling or printing error renamed it *thunbergella* seven years later – all to no avail. Columns to the right of the page summarise the species distribution: E (England), S (Scotland), W (Wales), I (Ireland) and C (Channel Isles).

The main checklist of 2518 species comprises resident and transitory residents, species believed to be extinct, and immigrants and some species that have probably been imported and found in the wild. However, there has been an increasing number of adventive species recorded in Britain, which cannot be regarded as part of our fauna, and are probably unlikely to re-occur, for examples those species found in exotic fruit and vegetables bought in our supermarkets, or exotic aquatic species occasionally recorded from aquarium shops. These are listed in Appendix A, Adventive Species, together with summarised details of their capture and status. Should any of these species become established over time, as seems likely with the more cosmopolitan species they have an ABH number and can be transferred easily into the main checklist. The second appendix, Appendix B, Questionable Records, lists those species whose records are either erroneous or unable to be confirmed.

I have found the checklist to be remarkably easy to use, though I have strayed into Appendix A when looking up the name of a resident species before realising my mistake – so a slip of paper in the handbook now divides the two sections. Checklists should be as accurate as possible and thus follow the ICZN codes for nomenclature as has been followed here. As an editor checking names, the biggest time waster is the procedure of placing brackets around an author's name when that species has been transferred to a new genus – this does not affect the validity of the name or the species identity in any way which is the true purpose of nomenclature, but allows the reader (if they understand) that the species was originally described under a different name. Some standard identification books do not follow this system while others do and the same applies to institutions and

journals. Some people I find place brackets around every author's name on the assumption that this is correct procedure and the error only becomes apparent when some familiar names are so listed and you know it cannot be true – then all the names have to be cross-checked. So, perhaps this is part of the fun of being an editor.

This is a wonderful new book in the RES Handbook series and the authors and contributors are to be congratulated, as well as the Handbook Editor, Mike Wilson and Publishing Editor Rebecca Farley-Brown. I look forward to the next checklist, on Hemiptera, in a few years time.

JOHN BADMIN

REFERENCES

Bradley, J. D. 2000. *Checklist of Lepidoptera recorded from the British Isles*. 116 pp. Fordingbridge. (privately published).

Heslop, I. R. F. 1947. *Indexed check-list of the British Lepidoptera, with the English names of each of the 2313 species*. 85 pp. London.

Sohn, J-C., Regier, J. C., Mitter, C., Davis, D., Landry, J-C., Zwick, A. & Cummings, M. P. 2013. A molecular phylogeny for Yponomeutoidea (Insecta, Lepidoptera, Ditrysia) and its implications for classification, biogeography and the evolution of host plat use. *PloS ONE* 8 (4) e55066: 1–23.

FIELD MEETING REPORTS

Beale Park, near Pangbourne, Berkshire, 14 June 2013

Leader: **Ian Sims**. – Beale Park is located just north of Pangbourne in Berkshire, on the A329. It is a wildlife park open to the public, and a member of BIAZA (British and Irish Association of Zoos and Aquariums). Its location, situated between the chalk hills of the Chilterns and the floodplain of the River Thames means that the site has several different habitat types including an extensive wetland and reed bed, unimproved alluvial grassland with ancient trees (mostly oak, field maple and some pines) and secondary woodland.

Fig. 1. *Polydrusus impressifrons* Gyllenhal (length 12 mm).

This meeting was arranged to coincide with the Beale Park BIOBLITZ, from 14 to 15 June. Despite the weather being near perfect for the time of year, turnout was low. Only three members of the Berkshire Moth Group, apart from the leader, attended. This resulted in only four 125W UV lights being run, but these were operated all night.

A total of 70 species of Lepidoptera was recorded. The more interesting of these coming to light included *Hepialus humuli* (L.) (Ghost moth), *Tethea ocularis* (L.) (Figure of 80), *Xanthorhoe designata* (Hufn.) (Flame Carpet), *Furcula bifida* (Brahm) (Poplar Kitten), *Eilema sororcula* (Hufn.) (Orange Footman) and *Lacanobia*

w-latinum (Hufn.) (Light Brocade). An example of *Apamea unanimis* (Hübn.) (Small Clouded Brindle), a local species inhabiting fens and marshes, was recorded by Paul Black while dusking on the reed bed. The only lepidopterous leaf miner in evidence was *Eriocrania subpurpurella* (Haworth), late vacated mines being found in oak foliage, while larvae of the Lunar Hornet moth (*Sesia bembeciformis* (Hübn.)) were evident mining the lower portion of a sallow trunk. Though a potential pest species, it was good to find several "nests" of Bird Cherry Ermine (*Yponomeuta evonymella* (L.)) larvae feeding on their food plant, Bird Cherry. These represent the first time larvae of this common (believed migratory) species have been found in Berkshire and support observations from elsewhere in the country (e.g. Oxfordshire & Cambridgeshire) that this northerly breeding species occurred in its immature stages much further south in 2013 than is normal. Many examples of *Morophaga choragella* (D. & S.) were obtained from a small piece of *Ganoderma adspersum* fungus collected for the purpose of rearing tineids and Coleoptera.

Where Coleoptera are concerned we were fortunate that Jon Cole was able to attend this meeting, as he recorded 14 species on the day. These included the locally common *Dorcus parallelipipedus* (L.) (Lesser Stag beetle) many examples of which were discovered in a wood pile, the longhorn *Grammoptera ruficornis* (F.) from a wooden fence and the flea-beetle *Aphthona nonstriata* (Goeze) on Flag Iris growing in a reed bed.

But by far the best beetle of the day was a bright green weevil found on an oak trunk. Jon provisionally identified this as a weevil new to the British Isles: *Polydrusus impressifrons* Gyllenhal (Fig. 1). Its identity has subsequently been confirmed by Max Barclay [BMNH] and Professor Michael Morris. The beetle in question was collected by the leader around 21.00h at head-height from the trunk of a large oak (c.2 or 3 hundred years old) growing in front of the Visitors Centre. As it happens, this is the second known example of this species found in the UK as *P. impressifrons* was collected at Hartslock Nature Reserve, on the opposite bank of the River Thames from Beale Park, in 2012 but not identified as such at the time. It is widespread throughout mainland Europe and has been found in North Africa and recently in North America, so it would be well worth searching for it elsewhere in the UK next year. The details of the discovery of these beetles are to be published in *The Coleopterist*.

We also recorded three species of Hemiptera, a mayfly, a wood louse and a millipede.

All-in-all quite a successful contribution to the 2013 Beale Park Bioblitz, with a new beetle being added to the British list and a new, though not necessarily all that welcome, lepidopterous breeding record for the county.

Wytham Woods, Berkshire, 6 July 2013

Leader: **Ian Sims.** – This was a joint field meeting between the British Entomological and Natural History Society and the Berkshire Moth Group.

Wytham Woods is owned by Oxford University and is used by students for biological field surveys. Having said that, you would think it well recorded for Lepidoptera. This was the case up until about 20 years ago, much of the early work being conducted by Dr C. Gibson. According to the site warden, Nigel Fisher, little recording of this group has been conducted since then. With this in mind, the objective for the meeting was to record nocturnal summer macrolepidoptera and to update the records for this site.

Given the excellent conditions prevailing (cloudy, humid and calm) it was disappointing that, apart from the leader only two people attended, both BMG

members. Consequently, we ran a total of four lights, three along a green ride to the south of the woods complex, and one on a small area of fenland situated further north.

A total of 119 species of Lepidoptera was recorded (103 macros and 16 micros). Among the more interesting macros were:

Pararge aegeria (L.) (Speckled wood), one to light. This remained active on the sheet for most of the night, *Euthrix potatoria* (L.) (Drinker), several to light but only on the fen, *Thyratira batis* (L.) (Peach Blossom), common on both the fen and green ride, *Comibaena bajularia* (D. & S.) (Blotched Emerald), several to light along the green ride, *Jodis lactearia* (L.) (Little Emerald), one to light on the green ride, *Eulithis prunata* (L.) (Phoenix), one to light on the fen, *Plemyria rubiginata* (D. & S.) (Blue-bordered Carpet), one to light on the green ride, *Hydrelia flammeolaria* (Hufn.) (Small Yellow Wave), several to light on the fen and green ride, *Biston betularia* (L.) (Peppered Moth), several typical examples on both the fen and green ride, and one melanic on the green ride, *Alcis repandata* (L.) (Mottled Beauty), several striking examples of ab. *conversaria* Hübn. on the fen (no typical examples seen here), while on the green ride only typical examples were seen.

Also noted were: *Mimas tiliae* (L.) (Lime Hawk-moth), one to light on the green ride, *Deilephila elpenor* (L.) (Small Elephant Hawk-moth), several to light on the fen, *Eilema sororcula* (Hufn.) (Orange Footman), late examples to light on the fen and green ride, *Callimorpha dominula* (L.) (Scarlet Tiger), one typical example to light on the green ride, *Anaplectoides prasina* (D. & S.) (Green Arches), one of the commonest noctuids on both the fen and the green ride, with total numbers recorded around the mid-30s or more, *Bena bicolorana* Fuessly (Scarce silver-lines), several on the green ride and *Lygephila pastinum* (Treit.) (Blackneck), one on the green ride (found under a lamp sheet while packing up).

Faversham Creek and Ham Marshes, Kent, 11 August 2013

Leader: **John Badmin.** – This was another joint meeting between members of the British Entomological and Natural History Society and the Kent Field Club to survey Faversham Creek, this time the western bank. Eight people turned up on what was expected to be a rainy day, but apart from a few spots mid morning we were blessed with good weather including a fair amount of sunshine.

The leader showed members an abandoned bumblebee's nest on the edge of an inlet by Crab Island which had been targetted by the velvet ant *Mutilla europaea* L. (Plate 6, Fig. 4).This is an extremely local bee in the county with recent records limited to just 10 coastal tetrads. Several pupal cocoons of *Bombus lucorum/terrestris* were dissected and evidence of *M. europaea* found. Somewhat unusually, the male is winged and the female is wingless, so how the emerging females locate a new bumblebee nest to parasitize in the following spring is a bit of a mystery. Being wingless the females presumably have to walk through the grassy terrain and chance upon a new nest – perhaps they are adapted to detecting gradients in small mammal odours, as several bumblebee host species are known to use abandoned mammal nest sites for their own nests. Experiments have shown that queen bumblebees can detect stale mammal urine/nest odour though the proportion doing so is not particularly high and other factors must be involved in nest site selection. It seems we know far more about the velvet ant's distribution than we do about its biology. The most commonly known fact is that the bee inflicts an extremely painful sting.

The party then walked around the buildings on the edge of town into open countryside, walking northwards along the creek. John Puckett and Hazel Ryan spotted a Clouded Yellow butterfly flying across the water as well as noting Painted Lady, Peacock and Comma at *Buddleja*. Holly Blues flew along a stretch of ivy-clad

wall, and whilst the leader was showing how well the ivy planthopper *Issus coleoptratus* (Geoffroy) jumps (it is the world leader, accelerating at 800g as it takes off, far faster than a flea or grasshopper), Roger Booth collected a small deathwatch type beetle from the beating tray which proved to be *Mesocoelopus collaris* Mulsant & Rey, a species just discovered new to Britain, and known only from the Chelsea-Putney area of London. An amazing discovery.

The botanists led by Stephen Lemon recorded intensively during the day and produced a good list. The most important find, by Stephen, was of Marsh Arrowgrass *Triglochin palustre*, which accordingly to our latest county Atlas, has declined markedly from 19 to a mere four tetrads in the space of 30 years. Other interesting finds included Soft Hornwort *Ceratophyllum submersum*, the buttercups *Ranunculus sardous* and *R. baudotii*, Strawberry Clover *Trifolium fragiferum*, Frogbit *Hydrocharis morsus-ranae* and two *Potamogeton* species. It was also nice to record all three of our native *Hordeum* species including Sea Barley *H. marinum* which is now recognised as increasingly uncommon and vulnerable. A large stand of Hog's Fennel *Peucedanum officinale* was observed growing on higher ground on the large expanse of saltmarsh at TR032629 (on the west side of the creek) which is difficult to access on foot.

The leader restricted himself to recording Hemiptera and was pleased to note several individuals of the local saltmarsh cixiid *Pentastiridius leporinus* (L.) which he had not recorded in the creek before – timing is crucial for this species. The few plants of Sea Wormwood located along the inner margin of the main expanse of saltmarsh (and the odd clump on the saltmarsh itself) revealed the presence of the RDB leafhopper *Chlorita viridula* (Fallén). Large numbers of the introduced Spartina planthopper *Prokelisia marginata* (Van Duzee) were evident in almost every muddy patch of cordgrass, confirming the planthopper's continued presence here despite unusual winter/spring conditions earlier in the year. It is here to stay. Grant Hazlehurst spotted the Nb Sea Lavender weevil *Pseudaplemonus limonii* (Kirby), a small but wonderfully shiny purple beetle a few mm long.

Roger Booth and Tony Allen spent a long time looking for beetles in dried-up ponds and muddy patches along the creek. They were well satisfied, recording a reasonable number of scarce or notable species such as the hydrophilid *Enochrus halophilus* (Bedel), and weevil *Bagous argillaceus* Gyllenhal. Twenty-nine coleopteran species were recorded from a small brackish pool surrounded by Sea Club-rush *Bolboschoenus maritimus* (TR022621) supporting the leafhopper *Paramesus obtusifrons* (Stål) (TR022621) including the hydrophilids *Enochrus bicolor* (F.), *E. melanocephalus* (Olivier) and *E. halophilus; Cercyon marinus* C. G. Thomson, *Haliplus lineatocollis* (Marsham) *Bembidion varium* (Olivier), *B. minimum* (F.), *Dyschirius luedersi* Wagner, *Heterocerus fenestratus* (Thunberg), *H. obsoletus* Curtis and the staphylinids *Philonthus quisquillarius* (Gyllenhal), *P. punctus* (Gravenhorst) and *Stenus cicindeloides* (Schaller).

This contrasted with a much smaller range of species (7) recorded from a small, freshly-dug circular pond in a middle of the field someway from the creek (TR024623), notably *Gnypeta carbonaria* (Mannerheim), *G. rubrior* Tottenham, *Berosus affinis* Bruillé, *Tachyporus hypnorum* (F.), *B. varium*, *P. quisquillarius*, and *H. fenestratus*.

THE SOCIETY'S PUBLIC LIABILITY INSURANCE

In 1997 the Society extended its third party liability insurance for cover in respect of official Society events to include field work carried out by members as part of their personal activities. It was expected that this would cover the insurance obligations, which accompany applications for collecting and recording permits in many cases.

The Society has received a number of queries regarding the scope of the cover provided and this notice will hopefully clarify the position.

At events arranged by the Society and its sister organisations, Dipterists' Forum, BMIG, and BWARS, public liability insurance is in place which covers injury and damage to third parties arising from the activities of members and guests. Events include both field meetings and indoor events such as workshops and exhibitions. The cover provided is £5,000,000. It is important that permits for field meetings are issued in the name of the Society, or sister organisation, or to an individual on behalf of the Society, not in the name of the leader of the meeting.

The Society's insurance policy also provides £5,000,000 of public liability insurance to individual members of the Society and sister organisations, in respect of their own field work and entomological research which is not part of a Society activity, providing this is undertaken in the United Kingdom and is not carried out with a view to financial reward.

Members who are contemplating carrying out field work on a paid basis are specifically excluded from this cover. We have now procured an arrangement by which such members can approach our brokers directly to obtain individual third party liability cover under our policy. This will incur the payment of an additional premium by the member concerned. We understand this will result in a very marked saving compared with obtaining this cover through a fresh policy.

We must emphasise that the cover referred to above is Public Liability Insurance and does not include Professional Indemnity, for which separate arrangements have to be made.

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Cover photograph: Small Tortoiseshell, *Agalias urticae* (L.) ab. *pseudoconnexa* Cabeaux reared August 2005. Photo: Karl Bailey.

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THE ESTABLISHMENT OF FUCHSIA GALL MITE, *ACULOPS FUCHSIAE* (ACARI: ERIOPHYIDAE) IN ENGLAND, A SERIOUS PEST OF FUCHSIA

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ABSTRACT

The Fuchsia gall mite *Aculops fuchsiae* Keifer, which is native to South America, was first detected in England in 2007. The mite causes extensive galling and unsightly distortion of the aerial parts of its host plants, *Fuchsia* species and cultivars. The establishment and known distribution of *A. fuchsiae* in England is presented along with details of its host range, lifecycle and control. The current and future impact of this pest in the UK and Europe is discussed.

INTRODUCTION

The Fuchsia gall mite, *Aculops fuchsiae* Keifer, is native to South America, and has become a problem in California, the Channel Islands and France (Ostojá-Starzewski & Eyre, 2012). In 2007 the mite was reported on the British mainland for the first time and it has since spread across southern England.

Aculops fuchsiae was described in 1972 from specimens collected from a *Fuchsia* sp. in Sao Paulo, Brazil in 1971 (Keifer, 1972); type specimens are held at Instituto Agronomico, Campinas, Estado São Paulo, Brazil and paratype specimens at the Entomological Research Division, USDA, Beltsville, Maryland, USA (CABI, 2012). The mites are 0.20 to 0.25 mm in length and 0.055 to 0.060 mm in width (Plate 9, Fig. 1). Similar to many eriophyid mites the body is fusiform, pale yellow to white in colour and bears only two anterior pairs of legs. The species is characterised by the short and acuminate anterior shield lobe over the rostrum, which is truncate underneath, plus the granules on the shield surface that obscure the shield pattern on the posterior part of the shield. This species closely resembles many of the other members of the genus; however, *A. fuschiae* is host specific and is the only eriophyoid mite recorded from *Fuchsia* species. Due to their small size the mites themselves can be difficult to identify, however the symptoms induced on infested fuchsias are diagnostic. The galls develop gradually, starting with a noticeable reddening of the leaves, particularly at the shoot tips, the leaves and flowers becoming grossly thickened and deformed as the infestation develops. Initially galled tissue is yellowish green and has a felt-like appearance (Plate 9, Fig. 2) but becomes reddened with age (Plate 10, Fig. 3). Symptoms of infestation are most strongly expressed at the terminal shoots, and can result in the complete suppression of new growth (Ostojá-Starzewski & Eyre, 2012), flower buds are also infested, causing grossly abnormal blooms. Feeding on pre-emergent leaf and flower buds by capsid bugs such as *Lygocoris pabulinus* (L.) (Miridae) can cause small ragged holes to appear on affected leaves followed by characteristic tattering and distortion and few flowers to subsequently develop (Plate 10, Fig. 4). This damage has frequently been mistaken by members of the public for fuchsia gall mite damage.

Establishment and distribution in Europe and the UK

Aculops fuchsiae was first reported outside Brazil in 1981 from San Francisco, California, USA, and it spread quickly throughout the state (Koehler, Allen & Costello, 1985). It has also been found intermittently in Western Washington and Oregon, but infestations there are believed to be periodically wiped out by winter cold (Anon, 2006). In Europe *A. fuchsiae* was first confirmed in December 2003 from specimens collected from eight sites around the Gulf of Morbihan, Brittany, France. However, it had probably been present since 2002 when symptoms were observed at the Festival de Trévarez, Brittany (May–September) on a *Fuchsia* from a private collection (Streito *et al.*, 2004), but is now widespread in Brittany (CABI, 2012). It was detected in the Channel Islands on Guernsey in July 2006 and on Jersey in October 2006, although it may have been present since 2001 on Jersey and is now widespread on the Islands (Ostojá-Starzewski & Eyre, 2012). The first report of *A. fuchsiae* on mainland Britain was made on 4th September 2007, when infested fuchsia shoots were sent to the Royal Horticultural Society (RHS) Advisory Service from a private garden in Portchester, Hampshire. Further investigations by the RHS and Food and Environment Research Agency (FERA) found that the mite was present in several private gardens in southern England (South Hampshire, West Kent, Middlesex and Surrey). The RHS and FERA have since received more than 200 records; in 2008 *A. fuchsiae* was reported on three occasions, from East Cornwall, South Devon and Middlesex; in 2009 there were seven reports spread across East and West Cornwall, South Devon, South Hampshire, the Isle of Wight and Middlesex. In 2010 32 reports were received from across southern England with the first records in the vice counties of Dorset, South Somerset, East Kent, West Sussex and North Essex. In 2011 108 records were received, mostly from counties where it had been reported in the preceding years, with the addition of Berkshire. During 2012 and 2013 more than 60 records were received, all from counties where the mite had been previously recorded. *Aculops fuchsiae* is now widespread in southern England (Fig. 1).

The mode of spread of *A. fuchsiae* is not well known, but it is likely to be similar to that of other eriophyid gall mites, which are spread locally by wind/air currents and pollinating insects, and in its native range possibly hummingbirds (Koehler, Allen & Costello, 1985). However the major route of dispersal over longer distances is likely to be anthropogenic movement of infested plant material, particularly as fuchsias are often propagated by vegetative means (cuttings) and this is thought to be its likely pathway of introduction into mainland Europe and the UK (Ostojá-Starzewski & Eyre, 2012).

Lifecycle

Aculops fuchsiae has four life stages: egg, larva, nymph and adult. Females lay up to 50 eggs at one time. At 18°C the eggs take 4 to 7 days to hatch and the lifecycle takes 21 days to complete (Ostojá-Starzewski & Eyre, 2012). All life stages are able to overwinter within the buds of fuchsia (Natter, 1982; Crawford, 1983). The mite is known to survive minimum temperatures of 5°C in California (Koehler, Allen & Costello, 1985) but, in the Pacific North West of the USA the mite is thought to be killed in severe winters, when temperatures remained below −6°C for 3 to 4 nights (Anon, 2006). The presence of *A. fuchsiae* on hardy (outdoor) fuchsias in southern England over five consecutive winters (2007–2012/3, Table 1), two of which saw prolonged periods with temperatures below 0°C may indicate that winter temperatures in southern England are not low enough to kill the mite (Met Office,

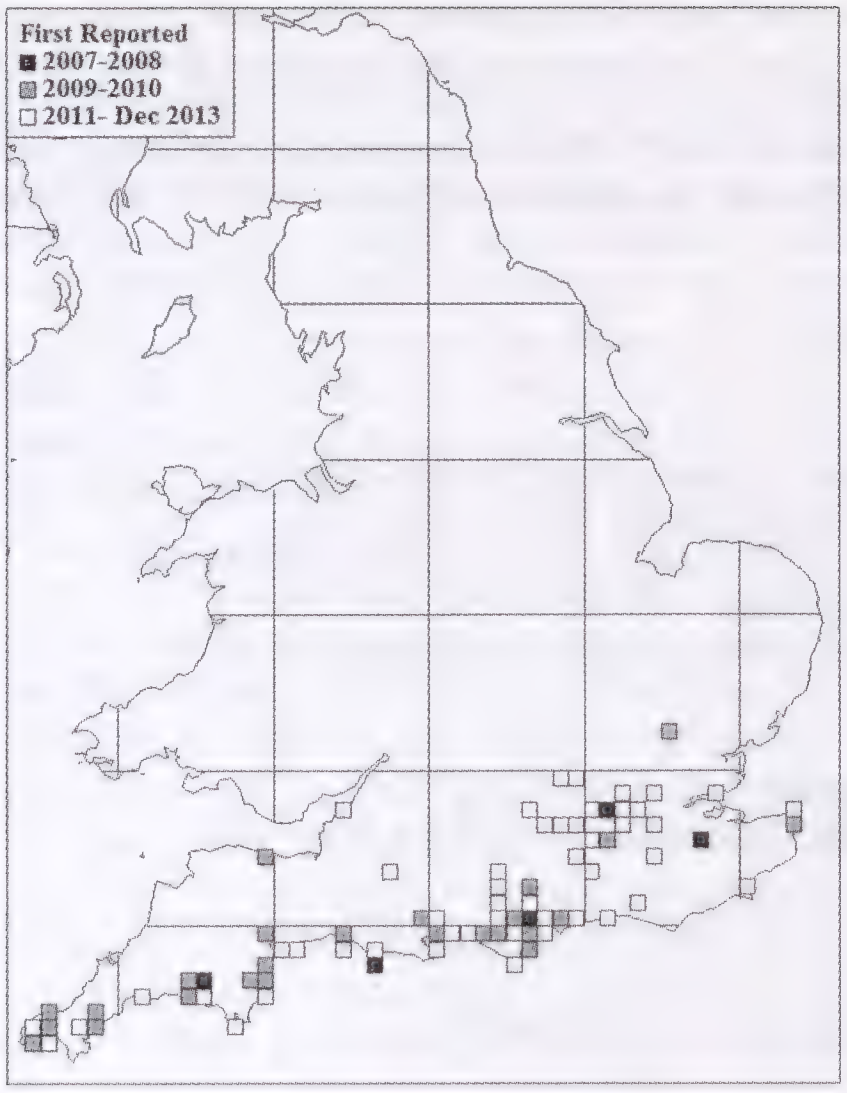

Fig. 1. Records of the Fuchsia gall mite, *Aculops fuchsiae* Keifer in England, 2007 to December 2013. RHS and Fera data. Produced using Dmap©.

2012); the mites are naturally more cold hardy than previously thought or that the populations now present have already adapted to survive at lower ambient temperatures. However, it is not known if the plants in these cases harboured the mite throughout the winter or became infested during the summer and further investigation is required. The mite may be intolerant of high temperatures as it was difficult to infest fuchsias under glasshouse conditions and its spread into warmer inland regions of California appears to have been slow (Koehler, Allen & Costello, 1985).

Hosts

Host plants of *Aculops fuchsiae* are limited to *Fuchsia* species and cultivars. The mite has been shown to survive on most *Fuchsia* species investigated although there is some variation in host susceptibility, with some species and cultivars showing no symptoms or only a trace of injury (Table 1, Koehler, Allen & Costello, 1985). Fuchsias that can be severely damaged include three species (*F. procumbens* R.Cunn, *F. coccinea* Dryander and F. *magellanica* Lam.) and 35 cultivars, whilst three species (*F. microphylla* Kunth, *F. thymifolia* Kunth and *F. arborescens* Sims) and 11 cultivars were noted to be highly resistant, with little signs of damage, although they were able to support populations of the mite. The same authors also noted that resistant cultivars tended to have small leaves and flowers. These may be less attractive horticulturally but may offer the potential for breeding more attractive mite-resistant garden worthy plants. In addition to the susceptible cultivars listed by (Koehler, Allen & Costello, 1985), samples of eleven named cultivars were received by the RHS and FERA which showed severe galling and so should be considered susceptible

Table 1. *Fuchsia* species and cultivars known to be resistant or susceptible to the Fuchsia gall mite *Aculops fuchsiae*. Plant hardiness category based on British Fuchsia Society (2001) and Boullemier (1991). Where H = hardy to at least RHS definition H3 ('plants hardy outside in some regions of the British Isles'), NH = Not hardy (RHS definition H2 or below, 'Plants requiring unheated or heated glasshouse conditions in the British Isles), U = no information available.

Fuchsia (Group/Cultivar)	Data Source
Resistant[1]	
Encliandra group (Native to Mexico and Central America)	
F. microphylla (H), *F. thymifolia*(H),'Baby Chang' (H), 'Cinnabarina' (H), 'lsis' (H), 'Mendocino Mini' (H), 'Miniature Jewels' (H), 'Ocean Mist' (H)	Koehler, Allen & Costello, 1985
Schufia group (Native to Mexico and Central America)	
F. arborescens (NH)	Koehler, Allen & Costello, 1985
Cultivars of unknown origin	
'Chance Encounter' (H), 'Englander'(U),'Golden West' (H), 'Voodoo' (H)	Koehler, Allen & Costello, 1985
Susceptible[2]	
Procumbentes group (Native to New Zealand)	
F. procumbens (H)	Koehler, Allen & Costello, 1985
Quelusia group (Native to Southern Andes and South East Brazil)	
F. coccinea (H), *F. magellanica* (H)	Koehler, Allen & Costello, 1985, RHS/FERA[3]
Cultivars of unknown origin	
'Angel's Flight' (H), 'Bicentennial' (H), 'Capri' (H), 'China Doll' (H), 'Christy' (H), 'Dark Eyes' (H), 'Display' (H),'Dollar Princess' (H), 'First Love' (H), 'Golden Anne' (U), 'Jingle Bells' (H), 'Kaleidoscope' (H), 'Kathy Louise' (H), 'Lena' (H), 'Lisa' (H), 'Louise Emershaw' (H), 'Marinka' (H), 'Novella' (H), 'Papoose' (H), 'Pink Marshmallow' (H), 'Psychedelic' (H), 'Raspberry' (H), Rose of Castle (H), 'South Gate' (NH), 'Swingtime' (H), 'Tinker Bell' (H), 'Troubadour' (H), 'Vienna Waltz' (H)	Koehler, Allen & Costello, 1985[2]
'Anita' (NH), 'Beacon' (H), 'Celia Smedley' (H), 'Jolly Nantes' (H), 'Lye's Unique' (H), 'Margaret Brown' (H), 'Mrs Popple' (H), 'Susan Olcese' (NH)	RHS/FERA[3]

1 In trials evaluated in California (Koehler, Allen & Costello, 1985). Although deemed resistant, these cultivars were able to support the mite and some showed traces of injury.
2 In trials evaluated in California (Koehler, Allen & Costello, 1985) showing moderate to severe injury in trials.
3 It is assumed that all reports to the RHS and FERA are of susceptible cultivars as initial diagnosis was made on the presence of galling.

hosts. Current information suggests that whilst all *Fuchsia* can at least support *A. fuchsiae,* those cultivars known to be bred from the Encliandra and Schufia taxonomic fuchsia groups and native to central America appear to be resistant, whilst those from the Procumbentes and Quelusia taxonomic groups appear to be susceptible. Further testing is required to determine if this remains true across all *Fuchsia* species in these groups.

Control

As with most gall-forming eriophyoid mites *A. fuchsiae* is difficult to control using the currently approved acaricides as any treatment needs to be applied before the mites enter the leaf and flower buds to be effective i.e. before symptoms become evident (Ostojá-Starzewski & Eyre, 2012). In California several pesticides (now mostly unavailable) were tested in a designed field trial. Although some suppression of the mite population was observed, surviving mites rapidly reproduced and no long-term control was gained (Koehler, Allen & Costello, 1985). Repeated applications are necessary to break the mite lifecycle, and one suggested regime is based on the knowledge that *A. fuchsiae* eggs hatch 4 to 7 days after being laid and so requires at least three acaricide applications at four-day intervals (Ostojá-Starzewski & Eyre, 2012). Trials in California showed that pruning and safe disposal of infested plant tissue in conjunction with any pesticide sprays gave the most satisfactory results (Koehler, Allen & Costello, 1985). Heat treatment of 45°C for 3½ hours failed to control the mite and caused some necrotic tissue on the plants (Koehler, Allen & Costello, 1985). Although several species of predatory mesostigmatid mites (Phytoseiidae) feed on eriophyoid mites, *A. fuchsiae* are relatively inaccessible to these predators once the galls have formed. However the mite *Amblyseius californicus* (McGregor), a commercially available biological control agent, has been found in association with *A. fuchsiae* in California and it is thought that it may be responsible for some "dampening" of fuchsia gall mite populations (Koehler, Allen & Costello, 1985).

Due to the difficulties associated with achieving effective control and the disposal of infested plants, quarantine measures should be implemented to reduce the likelihood of introducing this pest to more gardens. Good horticultural hygiene should also be followed, e.g. washing of hands and tools after contact with infested plant material and the movement of plants and cutting from areas where *A. fuschiae* is prevalent should be carefully considered.

Discussion – threats to European Fuchsia production

Aculops fuchsiae is considered a major pest of all but the most resistant species and cultivars of *Fuchsia*. In California some gardeners have given up growing fuchsias due to this pest (Koehler, Allen & Costello, 1985). The economic impact of *A. fuchsiae* in Europe is not yet known (Ostojá-Starzewski & Eyre, 2012) although there are undoubtedly economic impacts of legislation which attempts to stop its spread. *Aculops fuchsiae* is currently a regulated quarantine pest in the European Union (EU), therefore fuchsias require a phytosanitary certificate if they are imported from outside the EU. In addition, imports from Brazil and the USA require inspection immediately prior to export and a declaration that the place of production is free from *A. fuchsiae*. In Brittany, France, legislation now requires destruction of infested plants, increased official inspection and prevents propagation and movement of *Fuchsia* from infested areas (Ostojá-Starzewski & Eyre, 2012). Whilst these measures regulate the professional trade the exchange of material between amateurs is difficult to control, and this route may be the primary mode of spread of this pest to new areas. It is clear that the phytosanitary measures implemented so far have not stopped the spread of this pest to the Channel Islands and mainland UK and it is clear that the mite is established in southern England and may spread northwards.

Due to the number of records received from private gardens in England statutory action will only be taken on outbreaks reported in plant production nurseries or on

plant imports; in England and Wales these should be reported to FERA (tel: 01904 465625, planthealth.info@fera.gsi.gov.uk), in Scotland to the Scottish Government (tel: 0300 244 9772, hort.marketing@scotland.gsi.gov.uk), and in Northern Ireland to the Department of Agriculture and Rural Development (tel: 0300 200 7852, dardhelpline@dardni.gov.uk). The RHS is interested in records of this pest from gardens and findings can be reported to advisory_entomology@rhs.org.uk.

Acknowledgements

Thanks are due to Derek Luther for providing many records of Fuchsia gall mite and to Neil Alexander for comments on *Fuchsia* classification.

References

Anon. 2006. *Aculops fuchsiae*: Fuchsia gall mite – an eriophyid mite. *The Northwest Fuchsia Society*. (http://nwfuchsiasociety.com/mitesold.htm) Accessed December 2013.

Boullemier, L. B. 1991. *The Checklist of Species, Hybrida and Cultivars of the Genus* Fuchsia. 453pp. Bradford Press, London.

British Fuchsia Society. 2000. *All About Fuchsias*. 95pp British Fuchsia Society, Kidderminster.

Crawford, T. E. 1983. The fuchsia mite. *American Fuchsia Society Bulletin* **55**: 4–6.

CABI, 2012. Invasive Species Compendium, *Aculops fuchsiae*. (http://www.cabi.org/isc/?compid=5&dsid=56110&loadmodule=datasheet&page=481&site=144) Accessed Dec 2013.

Koehler, C. S., Allen, W. W. & Costello, L. R. 1985. Fuchsia gall mite management. *California Agriculture*. **July–August 1985:** 10-12.

Met Office. 2012. http://www.metoffice.gov.uk/

Natter, J. R, 1982. A grower's guide to the fuchsia mite. *American Fuchsia Society Bulletin* **54**: 87–88.

Ostojá-Starzewski, J. C. & Eyre, D. 2012. Fuchsia gall mite *Aculops fuchsiae* Keifer. Pest Factsheet, Fera, York. (http://www.fera.defra.gov.uk/plants/publications/documents/factsheets/fuchsiaGallMite12.pdf) Accessed December 2013.

Streito, J. C., Coroller, M. H., Kreiter, S., & Flechtmann, C. H. W. 2004. A new gall mite of Fuchsia: discovery in France of *Aculops fuchsiae*, first record in Europe. *Phytoma* **572**: 32–34.

SHORT COMMUNICATION

***Acleris variegana* (D. & S.) (Lep.: Tortricidae) feeding on Cornelian Cherry** – A specimen of Cornelian Cherry *Cornus mas* cv. Jolico (an edible cultivar) was observed with a small tortricid infestation at Macknade, Faversham, Kent in early August 2014. Pupae were collected and adults of *Acleris variegana* duly emerged on 10.viii. and 11.viii.2014, each a different colour form. The larva is known to be polyphagous feeding on Rosaceae and various other plants including *Ulmus*, *Vaccinium*, *Corylus* and *Berberis* (Bradley & Tremewan, 1973; Emmet, 1991). This appears to be the first recorded instance of *A. variegana* larvae feeding successfully on a species of Cornaceae.

This may represent a recent extension of host plant range, but there is insufficient detailed information in the published literature on larval food plants to substantiate such a hypothesis. – John Badmin, Coppice Place, Selling, Kent ME13 9RP.

References

Bradley , J. D. & Tremewan, W. G. 1973. *British Tortricoid Moths. Cochylidae and Tortricidae: Tortricinae*. 251pp. The Ray Society.

Emmet, A. M. 1991. Chart showing the life history and habits of the British Lepidoptera. pp. 61–301 in Emmet, A. M. & Heath, J. *(Eds.)*. *The Moths of Great Britain and Ireland Volume 7, Part 2. Lasiocampidae – Thyatiridae*. Harley Books, Colchester.

CONFIRMATION OF *NOTOSTIRA ERRATICA* (HETEROPTERA: MIRIDAE) AS A BRITISH SPECIES WITH COMMENTS ON ITS IDENTIFICATION

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ABSTRACT

The mirid grassbug *Notostira erratica* (L.) is confirmed from Britain and its continued presence in Ireland is reported. The voucher specimen from Aston Rowlant NNR has been deposited in the Oxford Museum of Natural History.

INTRODUCTION

The genus *Notostira* contains two species in Europe, *N. elongata* (Geoffroy) and *N. erratica* (L.). The species are polyphagous on grasses, feeding especially on the leaves (Wheeler, 2001). The ranges of the two species extensively overlap although *erratica* is considered the more northern species (Southwood & Leston, 1959, Woodroffe, 1977, Chond & Herczek, 2008). The two species are sexually dimorphic and bivoltine and within each sex there is considerable variation in colour and patterning (Chond & Herczek, 2008). Dolling (1973) showed that this variation was controlled by daylength and long-day summer bugs have green coloration, while short-day autumn bugs are brown. This sexual and seasonal variation makes identification of the two species on external characters impossible (Wagner, 1957). The taxonomic position of the two species was clarified by Wagner (1957) who showed that the males could be distinguished by the form of the parameres. Prior to Wagner's paper, the *Notostira* species listed from Britain and Ireland was *erratica* but subsequent to it, only *elongata* was included in Southwood & Leston (1959). It was stated in Southwood & Leston (1959) that the 'closely allied northern European *N. erratica* does not appear to occur in Britain'.

Halbert (1935) listed *N. erratica* from four localities in south-eastern Ireland and the occurrence of *N. elongata* in Ireland was referred to in Southwood & Leston (1959) presumably on the reasonable assumption that the situation in Ireland was the same as found in Britain. This assumption was not tested until Woodroffe (1977) examined all the available Irish *Notostira* voucher material contained in the national collections in Dublin plus some Irish specimens which were present in Massee's collection and many British specimens. This produced the surprising result that all the Irish specimens belonged to *erratica* and all the British material was *elongata*, creating a unique situation amongst the British and Irish Heteroptera of a single genus with two established species and with a different one present on each island. There was just one caveat to this situation as Woodroffe (1977) referred to two female specimens from Mildenhall, Wiltshire present in the Butler collection which he and, independently, Dolling (of the Natural History Museum, London) considered to be identical to Irish specimens of *erratica* and 'consequently, the presence of *erratica* in England must await confirmation by discovery of males.' The collection of a male *erratica* from a site in Oxfordshire by the author provides this confirmation. A record of *N. erratica* from Ireland is also presented providing confirmation of the continued presence of that species in Ireland.

METHODS AND RESULTS

My first encounter with a *Notostira* in Ireland was in July 2013 when carrying out a training course on the identification of Heteroptera at the National Biodiversity

Data Centre in Waterford. Part of the day was spent looking at the bugs present in the habitats around the centre. Much of this area is amenity grassland of limited floral diversity, but at the instigation of the NBDC a part is managed as a conservation measure with no cutting until late summer. Sweeping in this grassland produced many specimens of the common grassland Heteroptera but also several male and female *Notostira*. Four males and a female specimen were retained as vouchers. These were not examined closely at the time but kept in storage for later processing. In the first week of October 2013, I spent two days collecting Heteroptera around Oxford looking especially for species not found in Ireland. One day was spent as Aston Rowant NNR and a single male *Notostira* was swept from the chalk grassland at the top of Bald Hill. The assumption was that this would be a male *elongata* and would provide comparative material with the presumed Irish *erratica*. The capture of the Oxford specimen prompted me to look at all the material together and this gave the unexpected and surprising result that the males were identical and, based on the illustrations in Wagner & Weber (1964) and Woodroffe (1977), apparently all were *erratica*.

The details of the records are as follows:

BRITAIN: Oxfordshire, SU721963 Bald Hill, Aston Rowant NNR, 9 October 2013, 1♂ swept calcareous grassland.

IRELAND: Co Waterford, S554115, grounds of National Biodiversity Data Centre, Waterford Institute West Campus, Woodstown, 20 July 2013, many ♂ and ♀, swept former amenity semi-improved grassland managed as conservation area.

At this point, given the likelihood that a species new to Britain could be collected so casually, doubts crept in and the possibility that the specimens were in fact *elongata* was considered. Two male *Notostira* collected in Berkshire were supplied to me by Sheila Brooke and these were easily identified as male *elongata* and certainly proved that the Aston Rowant and Waterford specimens were all *erratica*.

Discussion

The discovery of this male *N. erratica* provides the confirmation of the presence of the species in Britain which Woodroffe (1977) could not find. The Waterford specimens of *Notostira erratica* appear to be the first Irish records of the species since 1938 when Halbert collected specimens at Killarney, Co. Kerry. Both Dolling (1991) and Woodroffe (1977) had speculated whether *erratica* still survived in Ireland, but given the low level of Heteroptera recording it is not a surprise that it has apparently been overlooked until now. The anomalous position of *N. erratica* in the British and Irish fauna is now removed. However the distribution of the two species still has puzzling aspects. As pointed out by Woodroffe (1977), *N. erratica* is a northern species in Europe and would not be expected to occur in Britain on southern chalk grassland or in southern Ireland. Woodroffe (1977) went as far as speculating that the Irish population had been introduced (although conceding that this was extremely unlikely) and that it had perhaps even died out. This is now known not to be the case although introduction cannot be ruled out. However *N. erratica* has been present in Ireland since at least 1900 (Halbert, 1935) and it is known from the case of the Cryptic Wood White *Leptidea juvernica* Williams that there are examples of grassland species present in Ireland but not in Britain whose native status is not disputed (Dincã *et al.*, 2013). As with the absence of *L. juvernica* what is required is an explanation for the absence from Britain rather than the presence in Ireland (Nelson, Hughes & Bond, 2011).

Now that *N. erratica* is confirmed as present in Britain, a re-examination of material will be required to determine the distribution of the two species. As mentioned already, the seasonal and sexual variation in the two species means that

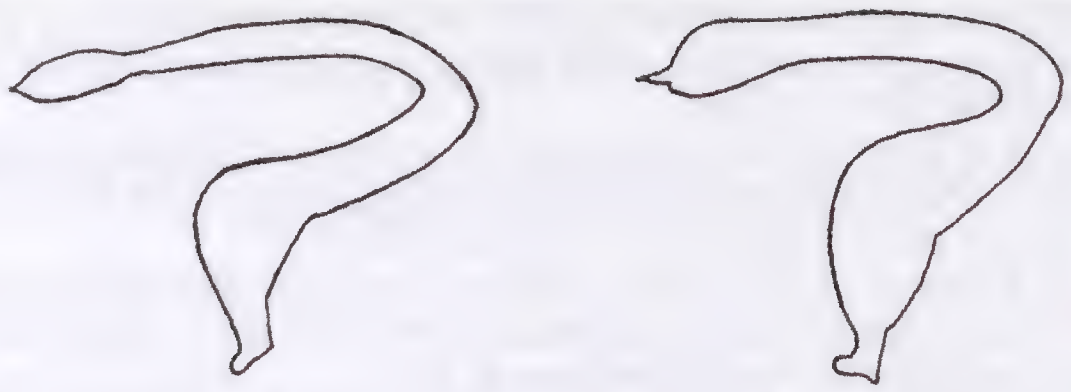

Figure 1. Left parameres of *Notostira erratica* (left) and *N. elongata* (right) reproduced from Woodroffe (1997) with permission from the Entomologist's Gazette.

only males can be certainly identified. The standard work on the British and Irish Heteroptera, Southwood and Leston (1959), does not illustrate the diagnostic shape of the male parameres so it is likely that some records of *elongata* have been made on the presumption that it was the only species present in Britain and without proper examination. Similarly photographs of *Notostira* cannot be accepted as valid records without vouchers. Wagner (1957), Wagner & Weber (1964), Woodroffe (1977) and Rintala & Rinne (2010) all provide illustrations of the parameres of both species. When specimens of the two species are examined together the differences in the overall shape and robustness of the left parameres of the two species are very obvious, but single specimens of either species may be difficult to determine. The most important distinction is the shape of the apex of the left paramere (Fig. 1). The left paramere in *Notostira* is large and robust and requires just a simple procedure of articulating it away from the genital capsule so that the shape of the apex can be seen. In *elongata* the apex is large and bulbous with a robust apical projection (this can be likened to a beak or thorn in shape). The bulbous tip is distinctly asymmetric and Bernard Nau (pers. comm.) expressed this well by describing it as having a pronounced 'chin' and prominent 'forehead'. In *erratica* the end is much less bulbous but it is clearly or nearly symmetrical above and below the smaller apical projection. There are other differences in the shape of the parameres in particular the shape of the 'arm' which is more slender and straight in *erratica* relative to the more robust and curved 'arm' of *elongata*. With experience of both species an unequivocal identification of a male specimen is rapidly possible.

The voucher specimen of *N. erratica* from Aston Rowlant National Nature Reserve has been deposited in the Oxford Museum of Natural History.

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References

Chond, D. & Herczek, A. 2008. Colour polymorphism in the genus *Notostira* Fieber (Hemiptera Heteroptera: Miridae) registered in Poland. *Aphids and Other Hemipterous Insects* **14**: 5–19.

Dincã, V., Wiklund, C., Lukhtanov, V.A., Kodandaramaiah, U., Norén, K., Dapporto, L., Wahlberg, N., Vila, R. & Friberg, M. 2013. Reproductive isolation and patterns of genetic differentiation in a cryptic butterfly species complex *Journal of Evolutionary Biology* **26**: 2095–2106.

Dolling, W. R. 1973. Photoperiodically determined phase production and diapause termination in *Notostira elongata* (Geoffroy) (Hemiptera: Miridae). *Entomologist's Gazette* **24**: 75–79.

Dolling, W. R. 1991. *The Hemiptera*. Oxford University Press, Oxford.
Halbert, J. N. 1935. A list of the Irish Hemiptera (Heteroptera and Cicadina). *Proceedings of the Royal Irish Academy* **42B**: 211–318.
Nelson, B., Hughes, M. & Bond, K. 2011. The distribution of *Leptidea sinapis* (Linnaeus, 1758) and *L. reali* Reissinger, 1989 (Lepidoptera: Pieridae) in Ireland. *Entomologist's Gazette* **62**: 213–233.
Rintala, T. & Rinne, V. 2010. *Suomen Luteet*. Tibiale, Helsinki.
Southwood, T. R. E. & Leston, D. 1959. *Land and Water Bugs of the British Isles*. Warne, London.
Wagner, E. 1957. Zur systematic der gattung *Notostira* Fieber (Hem. Het. Miridae). *Nachrichtenblatt der Bayerischen Entomologen* **6**: 1–5.
Wagner, E. and Weber, H. H. 1964. *Hétéroptères Miridae*. Faune de France **67**, Paris.
Wheeler, A. G. 2001. *Biology of the Plant Bugs (Hemiptera: Miridae)*. Cornell University Press.
Woodroffe, G. E. 1977. *Notostira erratica* (L.) and *N. elongata* (Geoffroy) in the British Isles. *Entomologist's Gazette* **28**: 123–126.

SHORT COMMUNICATION

***Emus hirtus* (L) – a new record of the Maid of Kent Beetle.** – On the morning of 21st April 2014 whilst following my young son down our garden at Uplees, Faversham, east Kent (TQ998645) to see what slugs, snails and worms we could find, we came across a moribund bee-like beetle lying quivering on the footpath. It was instantly recognisable as *Emus hirtus* (Plate 11, Fig. 1) and was quickly secured in a pot for closer examination. To my knowledge this is the first record of this species to be found on the marshes of mainland Kent immediately to the south of the Isle of Sheppey. This striking and unmistakable large RDB1 staphylinid beetle appears to have its British headquarters on the Isle of Sheppey (see Badmin, 2014) with recent records held in the database of the Kent & Medway Biological Records Centre coming from the National Nature Reserves at Elmley (BBC, 2010) and Swale (R. Smith, 2011; pers. comm.) approximately 2.5 to 3 kilometres away at their closest points across the Swale channel. The only other modern mainland Kent records come from further west on the RSPB reserves at Rye Street Common (Williams, 1999) and Cliffe Pools (BBC, 2013) on the Hoo Peninsular, Isle of Grain.

The odds of this individual finding its way to the garden of a coleopterist in the vast swathes of the grazing marshes around Uplees must be vanishingly small. Despite its short elytra, *E. hirtus* has well-developed hindwings and is known to be an active flier in search of recently deposited cowpats to lay its eggs in. Although this individual may have originated from Sheppey it is more likely to be part of a local resident population. Appreciable areas of the north Kent marshes are still managed as grazing marsh acting at the landscape scale as a 50km corridor for wildlife (see Badmin, 2014). This is due to the combined activities of Natural England, RSPB, Kent Wildlife Trust and latterly Buglife and the Bumblebee Conservation Trust in cooperation with local land owners thus ensuring the long-term survival of the many grazing marsh species associated with this region. – TONY WITTS, Kent & Medway Biological Records Centre, Brogdale Farm, Faversham, Kent ME13 8XZ.

REFERENCES

Badmin, J. S. 2014. (Ed.) The Natural History of Sheppey. *Transactions of the Kent Field Club* **18:** 1– 270.
BBC. 2010. Scarce Maid of Kent beetle spotted at RSPB reserve. http://www.bbc.co.uk/news/uk-england-kent-10957374 accessed 22 September 2014.
BBC. 2013. Endangered Maid of Kent beetle makes rare appearance. http://www.bbc.co.uk/news/uk-england-kent-22859323 accessed 22 September 2014.
Williams, A. 1999. Recent records of *Emus hirtus* (Linnaeus (*Staphylinidae*)) on the Isle of Sheppey, Kent. *The Coleopterist* **8** :112.

TWO NOVEL FLIGHT-INTERCEPTION TRAP DESIGNS FOR LOW-COST FOREST INSECT SURVEYS

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ABSTRACT

This paper introduces two passive trap designs which can be constructed on very low budgets at less than £1 per trap for the survey of flying Coleoptera and other insects. A trunk window trap and an aerial flight-interception trap are presented, based on commonly used designs, but using much cheaper materials. Construction diagrams are given, along with a description of trap installation and operation. Beetle species found using these methods during a survey of Ayr Gorge Woodland, a Scottish Wildlife Trust site in South-West Scotland are included. The traps were found to be relatively robust and easy to operate. It is hoped that these trap designs will be of use to others such as charitable organisations, students and amateurs who may previously have been unable to consider monitoring flying insects at large scales due to the prohibitive cost of equipment.

INTRODUCTION

The cost of carrying out large-scale invertebrate surveys is recognised as one of the most limiting factors for their inclusion in biodiversity studies (Oliver & Beattie, 1996). In addition many groups of insects can be difficult to sample at large spatial and temporal scales, often requiring specialist field knowledge and identification skills which are declining in the professional sphere (Hopkins & Freckleton, 2002). These factors combined mean that many groups of insects are often completely ignored in large-scale biodiversity surveys (Kim, 1993).

One passive insect survey method, pitfall trapping, is widely used for surveys of Carabidae and Araneae (Southwood & Henderson, 2000). However, passive trapping methods for other groups such as Diptera, Hymenoptera and flying Coleoptera require equipment such as Malaise traps and flight-interception traps which can be prohibitively expensive for large-scale surveys. This paper describes two novel trap designs for a trunk-window trap and an aerial flight-interception trap which can be made with widely available materials and which require no specialist equipment or skills to construct. The traps were constructed for less than £1 per trap, making them a viable option for studies that require highly replicated, inexpensive trapping regimes. There is a long history of entomologists designing, sharing and modifying trap designs for the needs of individual surveys (Carrel, 2002; Schulten, Ismay & Mann, 2005; Alexander & Chandler, 2011) and it is hoped that these traps will add to this literature and will be of use to other entomologists in a variety of settings.

TRAP CONSTRUCTION

Trunk Window Trap

Trunk window traps have been shown to be one of the most effective methods for surveying saproxylic beetles (Grove, 2000). The traps require a transparent solid

surface fixed at a right-angle to a tree trunk, with a collecting tray below containing a preservative. The trap works on the principle that adult beetles in flight will be attracted to the tree trunk either in search of food, a mate or a suitable site for laying eggs; the beetle hits the transparent surface whilst flying around the tree and either falls into the collecting tray or flies down into it whilst trying to navigate around the obstruction.

The transparent material used in trunk window trapping is usually Perspex as it is solid and durable. In this trial A4 (297 × 210 × 0.14 mm) acetate sheets, such as those commonly used for overhead projectors, were used in place of Perspex as they are cheap and readily available.

This trap design consists of two wooden stakes, one tied against a tree trunk and the other placed into the ground; between these a piece of acetate is stapled and a collecting tray filled with antifreeze (containing propylene glycol preservative) is fixed with drawing pins below. The collecting tray is a thin plastic food container (200mm × 120mm × 35mm), which can be bought in large quantities from discount stores, with a small hole cut in the side. Muslin cloth is stapled over this hole on the inside of the tray to allow rainwater to overflow without loss of the trap contents (Fig. 1). The traps trialled here stood one metre above the ground as this was the maximum height of the forest understorey layer and thought to be an appropriate height to catch nectar feeding beetles flying between vegetation, but the height can be adjusted to suit the needs of a particular survey. To empty the traps the collecting tray is simply unpinned from the trap and the contents poured into a jar.

Aerial Flight-Interception Trap

Flight-interception traps work on exactly the same principle as trunk window traps but allow for trapping in the canopy or away from tree trunks, where a different insect community is likely to be found.

This trap is made using two parallel pieces of wood (48 × 4 × 2 cm approx) fixed with an adjoining batten (28 × 4 × 2 cm approx.) at right angles across the top. An A4 sheet of acetate is stapled across the wooden frame and a collecting tray as described previously is pinned beneath the acetate. Two large screws are inserted into the sides at the top of the trap, from which the trap can be hung. Another two screws are fixed either side at the bottom of the trap, to which guide ropes are attached so that the bottom of the trap can be secured against the wind (Fig. 2).

This trap can be placed high in the canopy by attaching a weight to the end of a rope and throwing the rope over the desired tree branch. The trap is then attached to the rope, hauled up into the canopy and secured in place by tying the guide ropes to lower limbs of the tree.

Trap operation

These traps were trialled in a survey of the saproxylic beetles of Ayr Gorge, a 57.4 ha mixed woodland site 3 km north-east of Ayr (grid reference NS 457 249). The site is owned and managed by the Scottish Wildlife Trust and has one of the richest saproxylic faunas in Scotland. Ayr Gorge has a long history of entomological recording, including notable records from the beetle taxonomist Roy Crowson, best known for his studies on Coleoptera phylogeny and classification (Crowson, 1962; Crowson, 1979).

Sixty traps in all, thirty trunk window traps and thirty aerial flight-interception traps were installed throughout the site in the summer of 2007. Installing sixty traps

(a)

(b)

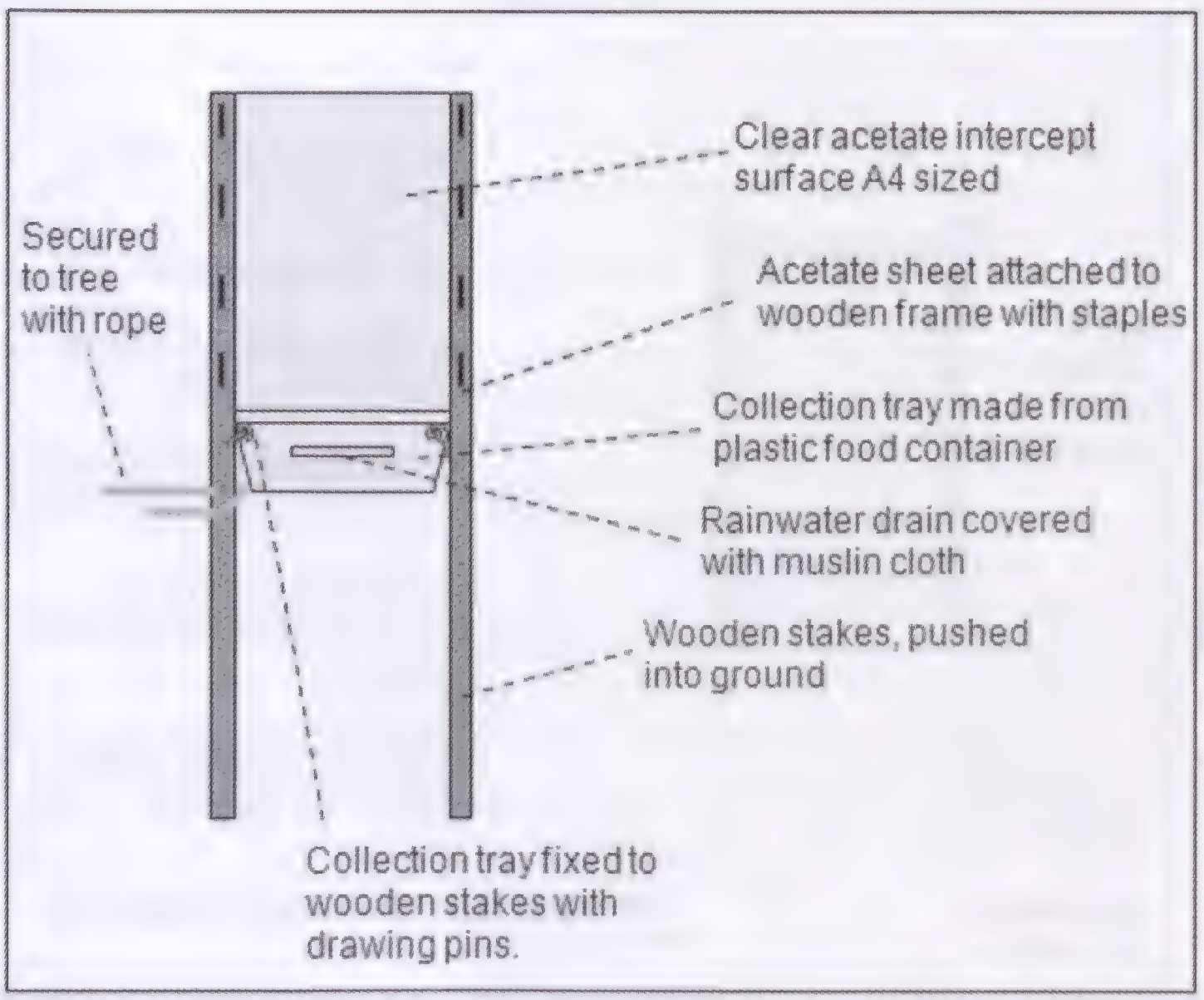
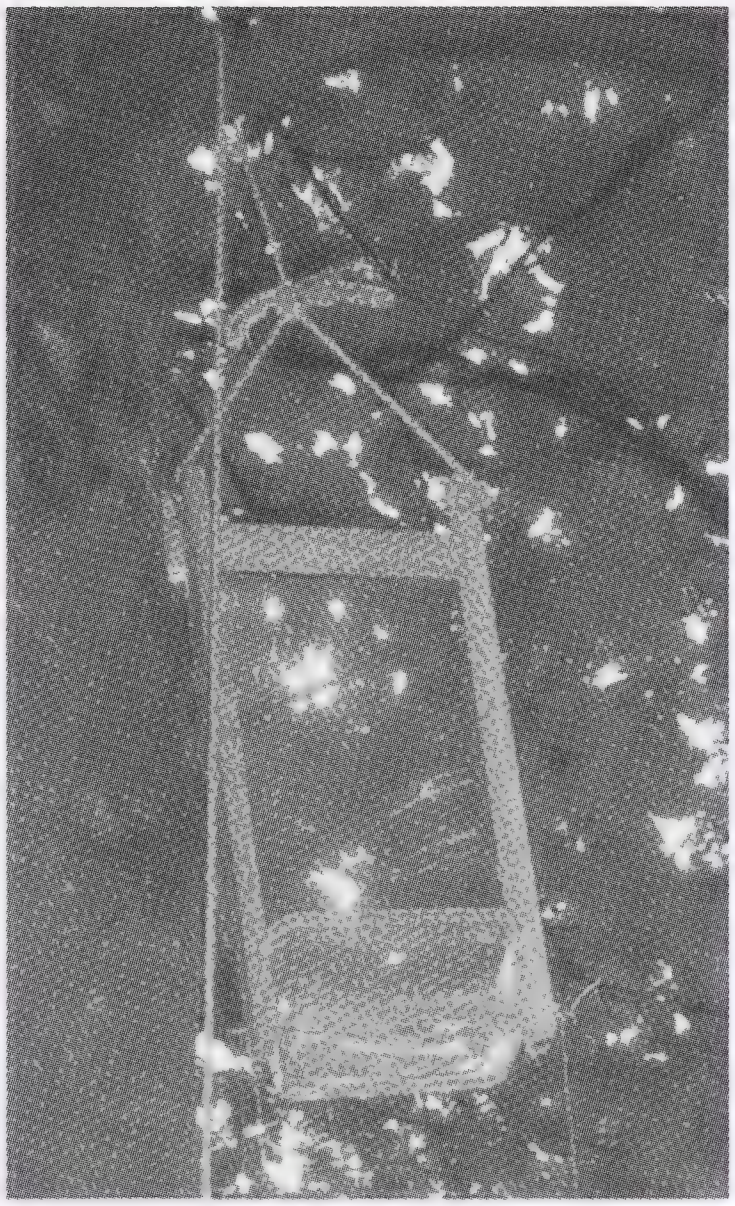

Clear acetate intercept surface A4 sized
Secured to tree with rope
Acetate sheet attached to wooden frame with staples
Collection tray made from plastic food container
Rainwater drain covered with muslin cloth
Wooden stakes, pushed into ground
Collection tray fixed to wooden stakes with drawing pins.

Figure 1. Trunk window trap in the field (a) and construction diagram (b).

(a)



(b)

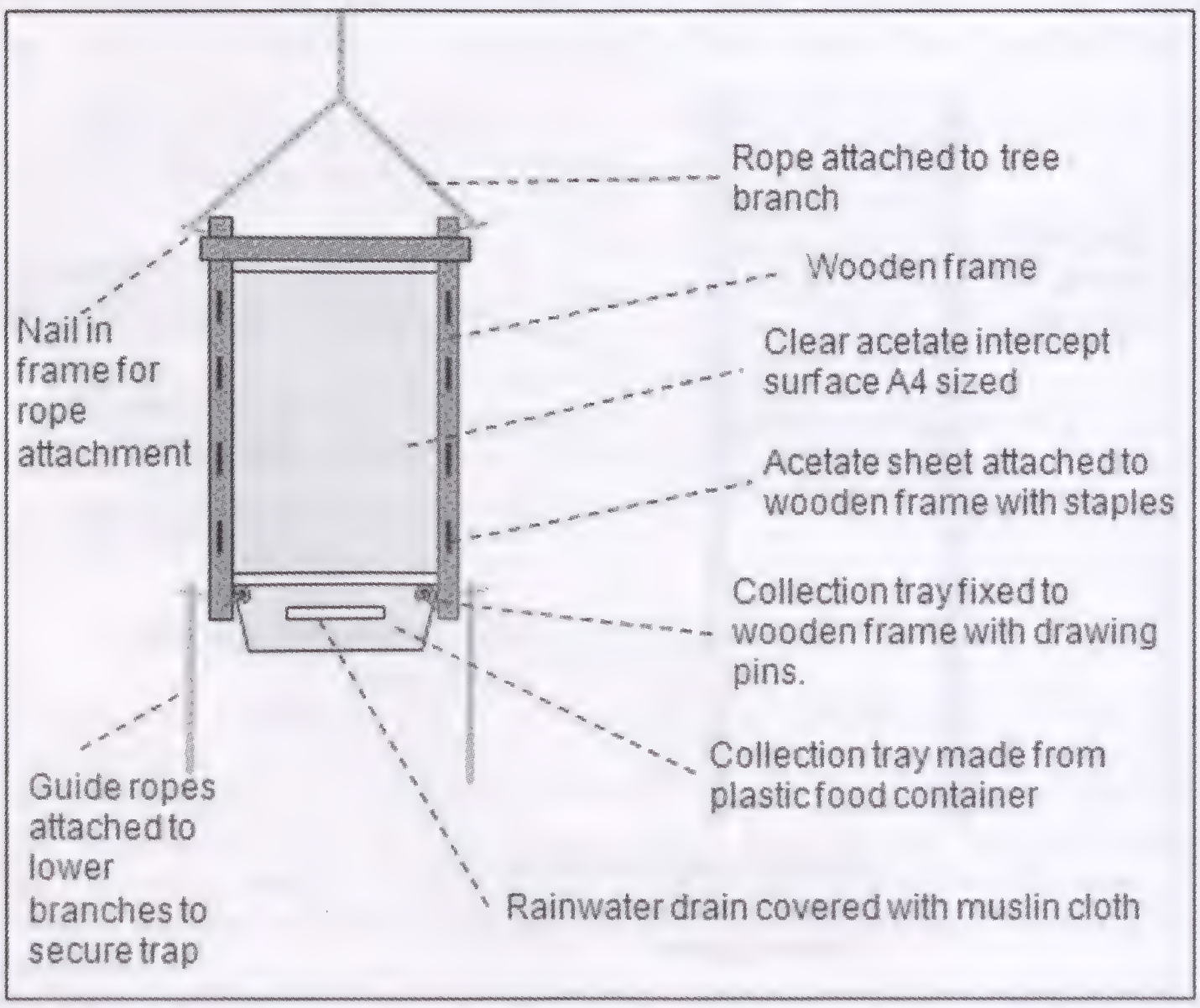

Rope attached to tree branch
Wooden frame
Nail in frame for rope attachment
Clear acetate intercept surface A4 sized
Acetate sheet attached to wooden frame with staples
Collection tray fixed to wooden frame with drawing pins.
Collection tray made from plastic food container
Guide ropes attached to lower branches to secure trap
Rainwater drain covered with muslin cloth

Figure 2. Aerial flight-intercept trap in the field (a) and construction diagram (b).

took approximately ten days for one person, but could be considerably faster with assistance as the task of carrying large numbers of traps into the field was the limiting factor. Trunk-window traps were very easy to install, but the aerial flight-interception traps required more time due to the difficulty of locating appropriate canopy branches and installing the ropes.

Emptying and re-filling all sixty traps took two people one to two days. Trays were unpinned from beneath traps and the contents poured into wide-necked collection jars. Collection trays were then pinned back into place beneath the intercept surface and topped-up with fresh anti-freeze. Traps were initially emptied on a weekly basis, but it was quickly found that the traps could be left for up to one month and still function successfully. Two weeks was found to be the ideal visitation rate in terms of balancing time spent visiting the site against the likelihood of traps becoming full or damaged.

The traps functioned successfully during the peak summer months, but in the autumn they became filled with dead leaves, so the addition of a roof to the traps would be recommended for surveying at this time of year. The traps are not robust to extremely high winds, with acetate sheets sometimes becoming torn away from the wooden frame. The traps can be easily repaired in situ by carrying spare acetate sheets, scissors and a stapler when visiting traps so that torn acetate sheets can be removed and new acetate sheets simply stapled in place.

The ease of repairing these traps gives them some advantages over Perspex traps, which can be brittle and prone to fracturing when carried into the field and which are not easily repaired. In addition these traps are much lighter than Perspex traps, meaning more traps can be carried into the field at any one time.

Trap catch

During July 2007 these sixty traps caught 428 beetles from 90 species, of which half were saproxylic. A full species list of trapped Coleoptera is given the Appendix. Two thirds of the beetle species recorded were new records for the site and of these 26 species were new saproxylic records. This increased the number of saproxylic records for this site by 50%. Most new site records were of small species such as those in the Ptilidae, Nitidulidae and Tetratomidae, families which can be difficult to find with hand-searching methods.

Traps caught an average of just over seven beetles per trap per month, which appears to be a low catch rate, but since we have been unable to find any comparable surveys for southern Scotland, it is difficult to tell if this represents a poor catch rate or is simply typical for lowland deciduous woodland in Scotland at this time of year. Looking at species accumulation curves for the species caught in the different trap types indicates that even sixty traps in a 57.4 ha site is insufficient to catch all potential species present as the curves had not yet reached an asymptote (Fig. 3).

A wide range of saproxylic beetle families were represented in the survey. Aerial flight-interception traps caught fewer individuals than trunk window traps, but the catch in the canopy represented a different community (Fig. 4). Some notable species found included *Anaspis thoracica* (L.), *Ptinus subpilosus* Sturm, *Malthodes guttifer* Keisenwetter, *Rhagonycha translucida* (Krynicki), *Epuraea terminalis* (Mannerheim), *Tetratoma ancora* F. and *Orchesia minor* Walker.

Conclusions

This trial showed that large scale passive trapping surveys for flying insects can be carried out on low budgets. It also demonstrated that even for well studied sites with

Figure 3. Coleoptera species accumulation curves with respect to (a) trunk window traps and (b) aerial flight-interception traps.

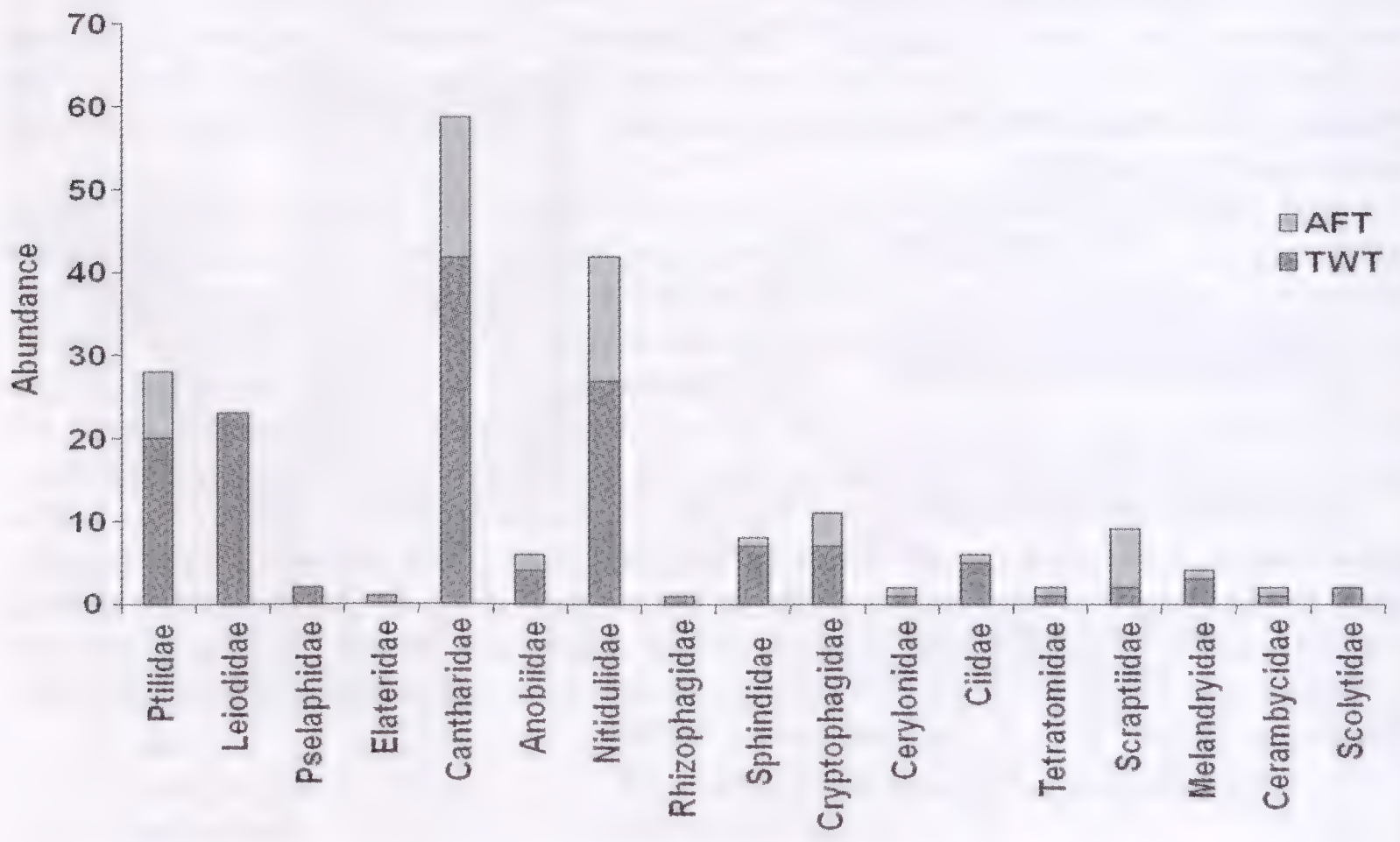


Figure 4. Number of beetles caught from saproxylic families in aerial flight-interception traps (AFT) and trunk window traps (TWT) during July 2007.

a long history of hand collection surveys (Crowson, 1962; Entotax Consultants UK, 2003) trapping can find unusual and rare insects infrequently captured using other methods.

This trial focused on saproxylic beetles, but the traps also caught large numbers of other flying Coleoptera, Hymenoptera and Diptera taxa. These trap designs are not as sturdy as those using Perspex or other rigid plastics, but are ideal for surveys being carried out with minimal funding during the summer months.

Acknowledgements

These traps were designed and constructed whilst undertaking a Coleoptera apprenticeship with The Conservation Volunteers 'Natural Talent' programme. Many thanks are due to Dr Joanne Mould and John McFarlane for managing Natural Talent; to Chiara Guidi for assistance in the field; and to all those involved who gave advice and support throughout the apprenticeship: Maggie Reilly, Georgina Brown, Dr Lorna Cole, Billy Harrison and Darren Mann. Thanks to the Hunterian Zoology Museum, Glasgow Museums (Glasgow Life) and the Scottish Agricultural College, Auchincruive for hosting the apprenticeship, the Scottish Wildlife Trust for allowing these traps to be trialled at Ayr Gorge and the Heritage Lottery Fund for funding the apprenticeship programme.

References

Alexander, K. N. A. & Chandler, P. J. 2011. A notable assemblage of fungus gnats (Diptera, Sciaroidea) from St John's Wood, County Roscommon, Ireland. *Dipterist Digest* **18**: 27–42.

Carrel, J. E. 2002. A novel aerial-interception trap for arthropod sampling. *The Florida Entomologist* **85**: 656–657

Crowson, R. A. 1962. Observations on Coleoptera in Scottish oak woods. *The Glasgow Naturalist* **18**: 177–195.

Crowson, R. A. 1979. Records of Coleoptera from some Clyde Valley sites in Scotland. *Glasgow Naturalist* **19**: 481–484.

Entotax Consultants UK. 2003. *Survey of notified saproxylic beetles for site condition monitoring in thirteen SSSIs in Scotland.* S. N. Heritage. Edinburgh.

Grove, S. J. 2000. Trunk window trapping: An effective technique for sampling tropical saproxylic beetles. *Memoirs of the Queensland Museum* **46**: 149–160.

Hopkins, G. W. & Freckleton, R. P. 2002. Declines in the numbers of amateur and professional taxonomists: implications for conservation. *Animal Conservation* **5**: 245–249.

Kim, K. C. 1993. Biodiversity, conservation and inventory – why insects matter. *Biodiversity and Conservation* **2**: 191–214.

Oliver, I. & Beattie, A. J. 1996. Designing a cost-effective invertebrate survey: a test of methods for rapid assessment of biodiversity. *Ecological Applications* **6**: 594–607.

Schulten, B., Ismay, J. W. & Mann, D. J. 2005. A new design of flight interception trap. *British Journal of Entomology and Natural History* **18**: 200–201.

Southwood, T. R. E. & Henderson, P. A. 2000. *Ecological Methods*. Oxford, Blackwell Science Ltd.

Appendix

Full Species List for Ayr Gorge Survey, July 2007:

Carabidae – *Loricera pilicornis* (F.), *Pterostichus madidus* (F.), *Platynus assimilis* (Paykull), *Amara aena* (De Geer), Hydrophilidae – *Cercyon haemorrhoidalis* (F.), *Cercyon impressus* (Sturm), *Cercyon melanocephalus* (F.), *Megasternum concinnum*

(Marsham), *Sphaeridium scaraboides* (L.), Ptilidae – *Ptenidium laevigatum* Erichson, *Ptenidium pusillum* (Gyllenhal), *Ptenidium nitidum* (Heer), *Euryptilium saxonicum* (Gillmeister), *Ptinella cavelli* (Broun), *Ptinella errabunda* Johnson, *Acrotrichis thoracica* (Matthews), Leiodidae – *Anisotoma humeralis* (F.), *Agathidium nigripenne* (F.), *Catops tristis* (Panzer), Silphidae – *Aclypea opaca* (L.), *Silpha atrata* L., Staphylinidae – *Bibloporus bicolour* (Denny), *Bryaxis curtisii* (Leach), *Neuraphes elongatulus* (Muller & Kunze), *Neuraphes talparum* Lokay, *Stenichnus collaris* (Muller & Kunze), *Tachinus rufipes* (L.), Scarabaeidae – *Aphodius rufipes* (L.), *Serica brunnea* (L.), Scirtidae – *Elodes minuta* (L.), *Cyphon coarctatus* Paykull, Throscidae – *Trixagus dermestoides* (L.), Elateridae – *Denticollis linearis* (L.), *Athous haemorrhoidalis* (F.), *Athous vittatus* (F.), *Dalopius marginatus* (L.), *Agriotes pallidulus* (Illiger), *Agriotes acuminatus* (Stephens), *Melanotus villosus* (Geoffroy in Fourcroy), Cantharidae – *Cantharis livida* L., *Cantharis rufa* L., *Rhagonycha translucida* (Krynicki), *Malthinus seriepunctatus* Kiesenwetter, *Malthinus flaveolus* (Herbst), *Malthodes flavoguttatus* (Kiesenw.), *Malthodes mysticus* (Kiesenw.), *Malthodes fuscus* (Waltl.), *Malthodes marginatus* (Latreille), *Malthodes guttifer* (Kiesenw.), Ptinidae – *Ptinus subpilosus* Sturm, *Dryophilus pusillus* (Gyllenhal), *Ernobius mollis* (L.), Sphindidae – *Aspidiphorus orbiculatus* (Gyllenhal), Nitidulidae – *Epuraea marseuli* Reitter, *Epuraea melanocephala* (Marsham), *Epuraea terminalis* (Mannerheim), *Soronia punctatissima* (Illiger), Monotomidae – *Rhizophagus bipustulatus* (F.), *Rhizophagus dispar* (Paykull), Cryptophagidae – *Cryptophagus dentatu* (Herbst), *Cryptophagus pubescens* Sturm, Cerylonidae – *Cerylon ferrugineum* Stephens, Coccinellidae – *Calvia quattuordecimguttata* (L.), *Halyzia sedecimguttata* (L.), *Aphidecta obliterata* (L.), Lathridiidae – *Cartodere* (*Aridius*) *bifasciata* (Reitter), *Cartodere* (*Aridius*) *nodifer* (Westwood), Ciidae – *Octotemnus glabriculus* (Gyllenhal), *Cis boleti* (Scopoli), Tetratomidae – *Tetratoma ancora* F., Melandryidae – *Orchesia minor* Walker, *Orchesia undulata* Kraatz, Scraptiidae – *Anaspis maculata* (Geoffroy in Fourcroy), *Anaspis rufilabris* (Gyllenhal), *Anaspis thoracica* (L.) *Anaspis regimbarti* Schilsky, Cerambycidae – *Grammoptera holomelina* Pool, *Grammoptera ruficornis* (F.), *Alosterna tabacicolor* (De Geer), *Leiopus nebulosus* (L.), Curculionidae – *Strophosoma melanogrammum* (Forster), *Otiorhynchus singularis* (L.), *Phyllobius argentatus* (L.), *Phyllobius glaucus* (Scopoli), *Polydrusus pterygomalis* Boheman, *Barypeithes araneiformis* (Schrank), *Barypeithes pellucidus* (Boheman), *Hylurgops palliates* (Gyllenhal).

Voucher specimens are held at the Hunterian Museum (Zoology), Glasgow, accession No.773 and Glasgow Museum, Glasgow Museums Resource Centre, accession No. Z.2007.59.

JANSON & SONS, A FAMILY AND FIRM OF NATURALISTS (1852–2000)

JOHN PHILLIPS

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ABSTRACT

Surprisingly very little can be found in the entomological literature on the subject of the Janson family, several of whom were prominent entomologists. The Jansons were natural history dealers and suppliers, based in London: the firms existing in various forms for nearly 150 years from 1852 until 2000. The following is an attempt to raise awareness of the parts that members of the family played and their contributions to the science of natural history and in particular entomology. Evidence is provided to show that Jansons produced their own make of cabinet.

INTRODUCTION

Over very many years I have always been intrigued by the name Janson, primarily on the basis that I currently own two entomological cabinets, both of which bear the Janson label which in my limited experience is somewhat unusual; as the majority of 19th and 20th century manufacturers i.e. Gurney, Crockett, Brady (with one notable exception) and others did not appear to specifically identify their cabinets and thus one is left to investigate their construction in order to attempt to allocate any particular example to any actual manufacturer.

Brady, universally recognised as perfection in entomological cabinet making is probably the best example; the narrowness of the grooved drawer frames, the four finger pulls, and the difficulty of opening and the airtightness of the drawers themselves, the discrete camphor cell at the front, the distinctive door construction and the general superb quality are all indicative and are never likely to be surpassed.

As for Janson the modern entomological literature is as far as I can ascertain somewhat limited and the name is not one that readily springs to mind which is a great pity for a dynasty of Naturalists which operated a business in London specialising in Entomology for very nearly 150 years. The research undertaken here reveals a fascinating story of the involvement of the Janson family in supplying equipment and services to the British entomological community with eminent clients such as Charles Darwin, Henry Bates and Alfred Wallace which emphasises the position that they must have established over the years.

My curiosity was recently aroused when reading a copy of the Collins New Naturalists series namely "Books and Naturalists" No 112 by D. E. Allen (pp. 226–227) where Edward Wesley Janson is documented in relation to the firms involvement in publishing and antiquarian book-selling (Fig. 1). It also notes the fact that on the demise of the firm well after the Second World War the firm's extensive records were passed on to the Natural History Museum, South Kensington and subsequently this is where the majority of the following archive information has been obtained.

As noted above my original curiosity was aroused due to my interest in researching the provenance of my Janson entomological cabinets. of which I have two: a 30 drawer museum style without doors (2 × 15) purchased from Watkins & Doncaster and a single tier 14 drawer unit with solid doors, inherited from a friend, F. C. Stanley of Rowland's Castle, Hampshire, both of which carry the Janson label (Figs. 2–4).

The current literature is not particularly helpful and very little seems to have been published on the subject of entomological cabinets in general. Ford (1979) in a paper

Fig. 1. Oliver Erichson Janson and his son Bob outside the shop at 44, Great Russell Street, London. Circa 1900.

entitled 'Entomological Cabinets' gives a comprehensive analysis of some past manufacturers naming all the well known manufacturers but no mention of Janson. In "The Aurelian's Fireside Companion" (Salmon & Edwards, 2005), a fascinating tome and incidentally a must read for every entomologist, the Ford article is reproduced with added information and some colour plates which brings the subject up to date.

I have also discussed the subject of Janson cabinets with various entomologist friends and acquaintances but again evidence is limited. George Morgan of Atropos Antiques from North Devon, the well known dealer in entomological cabinets was most forthcoming. He is of the opinion that Jansons never made cabinets, as there were many cabinet makers active in London towards the end of the 19th Century and that most were ordered from stock and branded their own; he does however state that he has handled many cabinets together with store boxes, pin boxes, nets and other equipment which all bore the Janson label.

Two pieces of specific evidence may help to substantiate the validity of Jansons as makers of entomological cabinets. My late friend, Malcolm Simpson, prior to his premature passing was engaged in forming 'The Simpson Collection of Entomological Memorabilia'; now housed partly by the British Entomological and Natural History Society at Dinton Pastures, Reading and partly at the Oxford University Natural History Museum – Hope Department. He provided me with a copy of part of a 1938 catalogue issued by W. H. Janson of 44, Great Russell Street, London WC1 headed Nature Study (especially Entomology) – Requisites and Specimens in which is offered amongst other things various sized cabinets, significantly stated as "Our own make" (see Fig. 5).

The Janson family research also reveals that **Percy Lynn Janson (1878–1958)** was listed in the 1901 census as being a carpenter; was associated with the firm and

Fig. 2. Janson 14 drawer cabinet.
Photo: John Phillips.

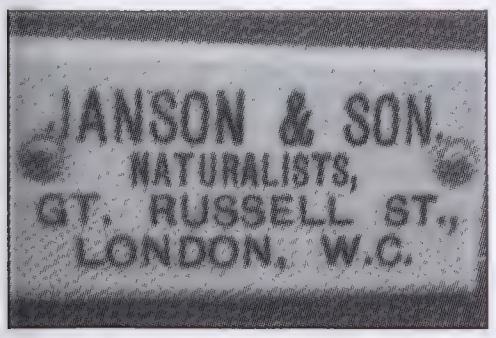

Fig. 3. The label attached to the cabinet listing Janson & Son as Naturalists of Great Russell Street, London, W.C. The cabinet also has a white '21' label which may refer to the production number.

provided cabinets for the display of entomological specimens. Thus it would seem that perhaps sometime during the lifetime of the firm some cabinets were made by a family member.

The Janson Archive

The comprehensive and detailed Janson Archive comprising numerous letters, correspondence and invoices that passed through the Janson business during its two centuries of existence was donated by **Derek Baillie Janson (1920–2006)** to the Library & Archives, Natural History Museum, London where it can now be accessed.

The Biographical Directory of British Coleopterists compiled by Michael Darby and published on the Internet (2014) covers the principal members and history of

the Janson family and references some of the interesting material obtainable from the archive including correspondence from the likes of C. G. Barrett, F. and H. W. Bates, E. A. Cockayne, F. W. Frowhawk, N. H. Joy, W. F. Kirby, E. Meyrick, E. Newman, H. J. Stainton and A. R. Wallace, to name but a few.

However fortunately and as luck would have it one recent member of the Janson family namely Charlotte Edwards (pen name Ceinwen Janson)) has taken it upon herself and had the foresight to produce a privately published history entitled *Shopping at Janson's – A Short History of a Firm of Naturalists* (2011) which gives a comprehensive insight into the family relationships over the years; a copy of which also resides in the Natural History Museum Janson archive.

The following notes on the Family and Business have been extracted from, and based on this work; permission for which is gratefully appreciated and acknowledged.

Family Members associated with the Business

The first member of the Janson family to settle in England was **John Christian Janson** from Holland in the early 19th Century, who was initially a merchant in the City of London employed by the Dutch Rhenish Railway. His eldest son was **Edward Wesley Janson (1822–1891)** soon joined by one brother and three sisters. It is not known when or where Edward Wesley Janson first discovered his enthusiasm for entomology but there is no doubt he began collecting insects as a small boy. After medical school he followed his father wishes by joining his London office and thus could only have pursued his passion for insects in his spare time out of office hours. In 1843 at the age of 21 he joined the Entomological Society of London

Fig. 4. A typical drawer of the Janson cabinet containing specimens of European hawkmoths. Photo: John Phillips.

BOTANICAL APPARATUS.

Presses (patented) new woven wire pattern, no pressure required, preserves natural colours, results are lifelike. Complete with drying material.

Size ...	7×9″ 1 strap	14×9″ 2 straps	16×12″ 2 straps
Each ...	2/6	4/6	6/6

Refills for presses, of super absorbent material, replacing drying paper previously used. Supplied in any size to order.

Size ...	7×9″	14×9″	16×12″
Per doz.	9d.	1/4	2/3

Vascula enamelled green inside and outside, prevents rust, extra strong metal with loops for strap, and wire handle.

Size ...	11×5½″	13×6½″	16×7½″
Each ...	5/6	6/3	7/6

Webbing Straps, 60″ long ... ... each 1/6

Trowel with short wood handle ... ... ,, 1/6

Mounting Paper stout cream Cartridge

Kew size	... 16½×10½″	... 8d. per quire	10/– per ream
size	... 17½×11¼″	... 8d. per quire	10/– per ream

Genus Covers stout manilla, folded to hold Kew size sheets ... ... doz. 1/6

Printed Data Labels ... ... per 100 1/9

Paste, preserved, transparent, for mounting ... ... per bottle 6d.

Brushes, nickelled ferrules, for setting Insects on Bristol Board or Celluloid mounts. Finest quality Sable Hair.

size No. 0	1.0mm.	Each ...	8d.	size No. 4	3.0mm.	Each	1/3
1	1.5mm.	Each ...	8d.	5	3.5mm.	Each	1/4
2	2.0mm.	Each ...	9d.	6	4.0mm.	Each	1/8
3	2.5mm.	Each ...	11d.				

Butterfly Envelopes, transparent, contents easily seen without opening.

	No. 1 2⅜×2″	No. 2 3½×3½″	No. 3 5½×4½″
per 100	9d.	1/–	1/3
per 1000	6/9	8/–	10/–

CABINETS.

(Our own make)

All made of well seasoned wood, drawers cork lined and papered and fitted with camphor cells, with lift-off glass covers, dustproof.

Insects.	Size of Cabinet	Polished as Mahogany without door	Fitted with Mahogany glass panel door
6 drawer	17×15×9″	£2 2 0	£2 13 6
8 drawer	22×18×11″	£3 17 6	£4 10 0
10 drawer	28×20×12″	£5 0 0	£5 15 0

Superior make of Cabinet with interchangeable drawers size 17×15×2″.

	Size of Cabinet	Polished as Mahogany, with Mahogany glass panel door
12 drawer	34×20×18″	£10 10 0
20 drawer	55×22×19″	£17 10 0

Fig. 5. Part of a Catalogue issued by William Harold Janson in 1938 advertising cabinets of "Our Own Make".

(subsequently to become The Royal Entomological Society) which had been founded in 1833. Many eminent entomologists were members including Charles Darwin (1809–1882) and thus he found himself in the company of some of the great naturalists of the day. In 1850 he was appointed curator of the Society's collections, while still engaged in his father's business activities.

However Edward Wesley Janson's passion for insects remained undiminished and in 1852 he set up his own entomological business as a natural history agent dealing with all aspects relating to the collecting, studying and identification of insects; consequently this was the formal start of the business.

The first child born to Edward Wesley was **Edward Mason Janson (1847–1880)**. As a young man he followed in his father's footsteps by taking up a professional position at the Royal Entomological Society, but unfortunately left soon afterwards

owing to disagreements with fellow entomologists. He subsequently travelled to Nicaragua in Meso-America to collect insects particularly beetles. His physical health may well have been adversely affected by his visits to the tropics, since although he returned to London in 1879 he died shortly afterwards on his return to Nicaragua in 1880 at the age of only 33.

The women of the Janson family also participated in the business from an early date. Edward Mason's youngest sister **Annie Emily Janson (1862–1942)** travelled to Cuba to collect specimens on behalf of the firm, and his older sister **Charlotte Gertrude Janson (1849–1946)** was an accomplished illustrator who applied water-colours to monochrome plates for several entomological publications including those used in Janson's *British Beetles* (1863). The second son of Edward Wesley was **Oliver Erichson Janson (1851–1925)** and there is no doubt that he inherited his father's enthusiasm for entomology especially the Coleoptera and the business that he inherited from his father thrived under his management.

In about 1889, **Oliver Jordon Janson (1876–1964)**, Oliver Erichson's eldest son became involved in the firm, specialising at first in Lepidoptera and then other areas of expertise. As a result he decided with parental help to start up his own business in 1911. His special expertise was in cataloguing insects, collections and natural history books and this evolved into a collaboration with Stevens Auction Rooms of Covent Garden, London WC1. This was in the heyday of commercial selling of insect specimens and collections providing him with an almost full time occupation.

The second son of Oliver Erichson was **Percy Lynn Janson (1878–1958)** who was recorded in the 1901 census as being a carpenter and he was associated with the firm in connection with the supply of entomological cabinets. As previously mentioned this is the only record of a family member being involved in cabinet making. Harold W. Janson (see below) states in his short history of the family business that cabinets were made by Percy, but were also bought in from Balham and Willesden to meet demand (family archive). Percy continued to be sub-contracted by the firm to provide cabinets, although by the 1920s the business was not in good financial shape.

William Harold Janson (1879–1960), the third son, and **Robert Baillie Janson (1888–1968)**, the fourth son of Oliver Erichson Janson eventually took over the running of the family firm from their father in the early 1900s; but unfortunately they soon fell out. Robert continued to run the shop in Great Russell Street, whilst William opened new premises in the Strand in 1938 trading throughout the war years supplying collectors who included Walter, Lord Rothschild, and carried on trading until his retirement and closure of the business in 1944.

Robert Baillie Janson worked as an engineer during the First World War, but in the 1930s returned to the family business working with his brother William until his departure in 1938. From thereon Robert maintained the family's original shop in Great Russell Street concentrating mainly on books; in fact he was somewhat ahead of his time in as much as his views encompassed ecology and conservation and the need to preserve habitats in order to maintain species biodiversity.

Ada Mary Janson (1890–1981), Oliver Erichson's youngest daughter, was involved in the paraphernalia of insect collecting including the making of net bags, mounting butterflies and moths in display cases and all that comprised the business of a natural history supplier.

William's son, **Harold Walter Janson (1911–1984)**, joined the business after training as an accountant, his interest in entomology being maintained from boyhood; but due to the business being depressed in the 1930s he left and joined the entomological staff of the Ministry of Agriculture Laboratory at Harpenden,

Hertfordshire now called the Rothamsted Experimental Station where he remained until his retirement in 1971.

Derek Baillie Janson (1920–2006) was the son of Robert Baillie and followed his father into the Natural History and Entomological bookselling business in Great Russell Street after serving in the RAF during the Second World War. He developed the business, re-establishing the supply of insect specimens and collecting apparatus, much of the equipment sold being made by him and his father Robert at their small workshop in East Finchley. The Janson bookshop in Great Russell Street opposite the British Museum remained a feature of Bloomsbury until the 1980s when it was moved out of London to Norfolk. The business finally closed in 2000.

Thankfully realising the historical significance and value of the firms records, its papers were donated by Derek Baillie Janson to the Natural History Museum, South Kensington archive in 1991 when where they can be accessed and researched by appointment.

The Family Business

The Janson family business dealt in natural history with a focus on entomology and styled themselves 'Natural History Agents and Booksellers' operating for the majority of the time from the premises at 44, Great Russell Street, London WC1 just across the road from the British Museum. The business was founded in 1852 (in Museum Street) and continued successfully for very nearly 150 years, surviving not only two World Wars but also at times strong family disagreements closing in 2000. They purchased and sold specimens and collections from all over the world and corresponded with many of the most important naturalists of the day, including Charles Darwin, H. W. Bates and the Rothschilds.

In the early days of the 19th century pursuing an interest in entomology was closely linked to owning a collection and acquiring this through the efforts of others required personal wealth. The decline and eventual demise of the business was linked to the reduction in acquisition of collections by private individuals, the emergence of professional, trained taxonomists and the centralisation of major, more comprehensive collections within national institutions.

The business at Great Russell Street that Oliver Erichson Janson inherited from his father Edward Wesley continued under his aegis through the latter half of the 19th century. Supplying the needs of collectors both amateur and professional was still the main day to day activity with Janson often purchasing collections at auction for wealthy clients. Being situated across the road from the British Museum meant easy access to collections and other entomologists. This, together with the many insect specimens passing through the business premises meant that Oliver acquired a high level of expertise in identifying insect material. This led to much work in an advisory capacity in forestry and agriculture.

One interesting expanding commercial activity undertaken by Oliver Jordan Janson was the collection of polyporus bracket fungi from the New Forest and Epping Forest for mounting small insect specimens. The fungus was cut into strips, dried and dispatched in batches to museums and private collectors both in the UK and around the world including the USA. Double mounting is now standard practice for many insect groups but the use of polyporus strips has now largely been replaced by using strips of synthetic plastazoate/plastic material which does not dry out and become brittle over time.

The only mention of cabinet making is by Percy Lynn Janson, Oliver Erichson's son who is listed in the 1901 census as a carpenter; though there is some doubt if all

the cabinets bearing the Janson label were in fact made by him as the demand was considerable. Many were built to a high standard.

Many of the customers of Oliver Erichson including Walter Rothschild and the Chadwick Museum in Bolton commissioned him to make purchases at natural history auctions on their behalf; he was also closely associated with Stevens Auction Rooms in London and was their advisor and expert for their natural history sales. The court room could also be the setting for entomological drama, and Oliver Erickson was quite often called upon to give evidence as an expert witness on matters entomological.

As the 20th century progressed the trade in insects purchased by private wealthy collectors was no longer sustainable and in the late 1920s other avenues were explored in order to widen the firm's business interests. Educational Authorities, Museums and Crown Agents were successful lucrative ventures; also through the British Museum (Natural History), Cromwell Road, South Kensington, London various expeditions were equipped for professional collecting.

From the early days publishing was an important aspect of the business with natural history books and accounts of insect collecting expeditions, in particular the one in 1839 led by Captain James Clark Ross to the Antarctic (Richardson & Gray, 1844-1845) provided the material for a lavish publication by E. W. Janson. The surgeon and botanist on the trip was none other than Joseph Hooker, the future director of Kew. This beautifully illustrated book has since become a valuable collector's item. E. W. Janson also financed and published eleven works between 1870 and 1882 including the *Journal of Entomology* (in 14 Parts from 1862–1866 with Taylor & Francis); the *Cistula Entomologica* (in 29 Parts from 1869–1885) and a volume of *British Beetles* in 1863 with illustrations from Curtis's *British Entomology*.

The first Janson business premises were at 30, Museum Street, London where E. W. Janson in 1868 described himself as a "Natural History, General Agent and Bookseller" where it remained until 1869. In about 1871 the business moved to 28, Museum Street; during 1875–1876 it was to be found at 35, Little Russell Street and by 1886 was subsequently at 44, Great Russell Street under the new name of Janson & Sons.

In later years the name changed again to O. E. Janson & Son; but after the estrangement of brothers William and Robert from October 12th 1938 William's alternative enterprise became known as "The Entomology Company", 446, The Strand.

The interest in collecting entomological specimens had its most halcyon days in the 19th century continuing into the early part of the 20th century and must be considered the *Heyday of Natural History* (see Barber, 1980) and Janson's clients included some of the elite names of the period. Many emanated from the upper levels of the aristocracy including The Marchioness of Bute, Mrs Stafford Cripps (wife of Richard Stafford Cripps, former Chancellor of the Exchequer), Lady Amherst of Hackney, Lady Burdett-Coutts, Eleanor Ormerod, Lord Rayleigh and Sir Vauncey Harper Crewe (Calke Abbey, Derbyshire) were all listed in Janson correspondence.

Numerous museums, institutions and publications are also listed in Janson correspondence including the Smithsonian Institute, the Rijks Museum, Leiden, Bolton Museum, the Director of Agriculture Bagdad, Iraq, the American Museum of Natural History and the Agent-General for South Australia all of whom used Jansons to build up entomological collections.

The Hon N. Charles Rothschild was a frequent purchaser as was Walter Rothschild at Tring sometimes causing some administrative confusion; Henry Walter Bates (1825–1892) was also a frequent purchaser of specimens from E. W. Janson and his work aided Charles Darwin (1809–1882) in reaching conclusions on

his Theory of Natural Selection (1859). The other Bates with whom E. W. Janson corresponded was the younger brother namely Frederick Bates (1829–1903).

Undoubtedly the most famous client of the Jansons was Charles Darwin and the majority of correspondence between them concerned the sale of specimens. It is recorded that in May 1868 Darwin paid eleven shillings for "insects" probably beetles. Edward W. Janson and Darwin were both members of the Entomological Society of London. All great scientists require assistance in their research and as luck would have it E. W. Janson was, due to his business contacts, in a position to provide scientific support to the great man. Darwin (1871) in his opus "The Descent of Man" (p. 289) paid tribute to and acknowledged the help that E. W. Janson had given him with both information and specimens, What better endorsement can there be than that?

Conclusions

As noted in the introduction my interest in the name Janson was initially aroused merely by the label attached to two of my own insect cabinets; little did I realise the extent of the family's involvement in entomology over the best part of 150 years. In many respects they were fortunate to operate during the 19th and early 20th centuries at a time when the world's fauna and flora were being collected and catalogued for the first time. The true Heyday of Natural History.

During this research it has become clear the significant contribution that the family Janson has made to the science of entomology and the entomological community and I trust that the preceding notes may have gone some way to bringing the name Janson to the notice and attention of a wider audience.

Acknowledgements

My sincere thanks are due to a considerable number of people including Alec Harmer of Lymington for his continued support and interest in all things historically entomological; to George Morgan of Atropos Antiques, Devon, for his helpful comments on entomological cabinets; to Terry Dillon for comments on published material; Martin Honey (NHM) and Harriet Campbell-Longley (NHM Museum Library & Archives) for advice and location of material; to Colin Wood for assistance and finally to Charlotte Edwards for her considerable dedicated research effort into the Janson archive and in producing her valuable work "Shopping at Jansons – A Short History of a Firm of Naturalists" and allowing me the privilege in quoting from its contents, without which this article could not have possibly been written. This is also dedicated to the fond memory of my great friend the late Malcolm Simpson who some time ago suggested that I might put pen to paper but sadly did not get to see it finished.

References

Allen, D. E. 2010. *Books and Naturalists. No. 112.* Collins – The New Naturalist Library. HarperCollins, London.

Barber, L. 1980. *The Heyday of Natural History.* Doubleday & Company.

Darby, M. 2009. Biographical Dictionary of British Coleopterists. *www.coleopterist.org.uk/biogdict-intro.htm.*

Darwin, C. 1859. *On the origin of species by means of natural selection.* John Murray, London.

Darwin, C. 1871. *The descent of man and selection in relation to sex.* John Murray, London.

Ford, R. L. E. 1979. Entomological Cabinets. *Entomologists Record and Journal of Variation* **91**: 308–310.

Janson, C. (C. Edwards) 2011. *Shopping at Jansons – A Short History of a Firm of Naturalists*. Natural History Museum, Library & Archive.
Janson, E. W. 1863. *British beetles, transferred from Curtis's Entomology, with descriptions*. Bell & Daldy, London.
Janson, H. W. The Janson Family. Family archive.
King, N. 1953. A Naturalist's Tradition. *Nature Magazine* **46**: 131–134, 162.
Richardson, J. & Gray, J. E. (eds.) 1844-1845. T*he zoology of the voyage of the H.M.S. Erebus and Terror, under the command of Captain Sir James Clark Ross, during the years 1839 to 1843*. By authority of the Lords Commissioners of the Admiralty. E. W. Janson, London.
Salmon, M. A. & Edwards, P. J. 2005. *The Aurelian's Fireside Companion – An Entomological Anthology*. Paphia Publishing Ltd.

SHORT COMMUNICATIONS

Delayed emergence of *Callirhytis erythrocephala* (Giraud) (Hymenoptera: Cynipidae). – Asexual female *Callirhytis erythrocephala* (Giraud) develop in galls in the acorns of Turkey oak *Quercus cerris* L. The gall-chambers develop inside the acorn beneath the outer wall, generally in small clusters. The galls do not protrude through the wall but affected acorns can be detected by slight distortions to their shape. The majority of the gall inducing Cynipidae emerge either in the same year as, or in the year after, gall development. A few species occasionally diapause for a further year. However, *C. erythrocephala* shows delayed emergence over longer time periods (Niblett, 1933).

Galled acorns were collected off the ground beneath trees of *Q. cerris*, from Holly Hill near Vigo, Kent (TQ6662), High Halstow, Kent (TQ7876) and Minsmere, Suffolk (TM4766) on the dates below. The galled acorns were stored in large plastic sweet jars enclosed by fine netting and occasionally wetted. The jars were retained in a well ventilated and shaded garden shed. There are very few records of *C. erythrocephala* in Great Britain so the full emergence details of the asexual females are given.

The first date for each series (in bold) is the collection date, the second and subsequent dates that of adult emergence. The number of asexual females reared is given in parentheses.

Holly Hill, **29.iv.1998**, 30.iv.2001 (3);
Holly Hill, **14.x.1999**, 4.iv.2001 (2), 5.iv.2001 (3), 7.iv.2001 (1), 20.iii.2002 (1), 23.iii.2002 (1), 25.iii.2002 (6), 26.iii.2003 (1), 27.iii.2003 (2), 28.iii.2003 (1), 29.iii.2003 (6); 18.iv.2003 (5);
Holly Hill, **29.iv.2000**, 3.iv.2001 (1), 4.iv.2001 (4);
Holly Hill, **13.xi.2006**, 3.iv.2011 (15), 5.iv.2011 (8), 9.iv.2011 (1), 11.iv.2011 (6), 13.iv.2011 (2), 15.iv.2011 (3), 3.iv.2012 (3), 5.iv.2012 (2), 18.iv.2013 (7), 1.v.2013 (3), 3.v.2013 (1), 8.v.2013 (2);
Holly Hill, **28.ix.2009**, 8.iv.2011 (2), 25.iii.2012 (5), 18.iv.2013 (45), 3.v.2013 (1);
Holly Hill, **22.x.2010**, 28.iii.2012 (1), 18.iv.2013 (24);
High Halstow, **1.x.1999**, 25.iii.2002 (1), 28.iii.2002 (1);
Minsmere, **7.xi.2006**, 6.iv.2011 (2), 11.iv.2011 (2), 13.iv.2011 (1), 21.ii.2012 (2);

These records show that *C. erythrocephala* can emerge up to at least seven years after gall formation (see also Eady & Quinlan, 1963). The clusters of galls become very hard and woody and can persist even as the acorn itself decays. I have no knowledge of the alternate sexual generation gall of *C. erythrocephala*, but Melika (2006) states that it is extremely cryptic and forms below the bark of branches and

shoots. The emergence data above show that these galls will be induced by asexual females from several year cohorts e.g. Holly Hill in spring 2001. What advantage delayed emergence gives *C. erythrocephala* is unknown. – M. T. JENNINGS, 206 Lower Higham Road, Gravesend, Kent, DA12 2NN.

REFERENCES

Eady, R. D. & Quinlan, J. (1963). Hymenoptera: Cynipidae. *Handbooks for the Identification of British Insects* VIIII. Part 1(a). 81 pp.

Melika, G. 2006. Gall Wasps of Ukraine. *Vestnik zoologii* **21**: 305–644.

Niblett, M. 1933. British gall-causing Cynipidae: some notes on their emergences. *Entomologist* **66**: 149–153.

Some records of *Andricus gemmeus* (Giraud) (Hymenoptera: Cynipidae) from Kent. – On 12.x.2012 agamic galls of *Andricus gemmeus* (Giraud) were found on buds on the bark of the main trunk of a large oak tree (*Quercus robur* L.) at Cobham, Kent (TQ6968). The galls were roughly spherical, 3–4 mm in diameter and were coloured greenish yellow to red (Plate 11, Fig. 2). The surface of the fresh gall is covered by small lobes which make the gall look like a miniature flower head. A few galls were opened and each contained a single white cynipid larva. On the same date further galls were found in the same situation on other oak trees at Cobham (TQ6769). On 22.x.2012 galls were also found at Shorne (TQ7070). Here galls were found on the branches as well as the trunk of the trees. On 12.xi.2012 galls were found at Shorne (TQ6870 and TQ6871). Galls collected at Cobham (TQ6968) and Shorne (TQ7070) were retained in a well-ventilated and shaded garden shed and on 9.viii.2013 one asexual female emerged from each collection. Subsequently, from the Shorne collection, one asexual female emerged 10.viii.2013 and another on 14.viii.2013. The specimens were identified by reference to Melika (2006).

No parasitoids were reared from the galls but one female *Synergus* sp. (Hymenoptera: Cynipidae) emerged from the Shorne collection on 9.vii.2013 and another on 14.viii.2013. *Synergus* species are known to be inquilines in cynipid galls but it has not yet been possible to identify the two specimens. More galls were found on 18.x.2013 at Rough Common, Canterbury (TR1159) and it is likely that *A. gemmeus* is now widespread in Kent.

Andricus gemmeus was first recorded in the British Isles from Essex (Bowdrey, 2009) and has since been reported from Wiltshire, Northamptonshire (Bowdrey, 2011), and Warwickshire (Cooke, 2011). *Andricus gemmeus* has been reported from Austria, Bulgaria, Croatia, France, Germany, Greece, Hungary, Italy, Moldova, Poland, Portugal, Romania and Spain (Mitroiu, Fauna Europaea, 2013). To these can be added Iran and Ukraine Melika (2006).

Specimens of *A. gemmeus* have been placed in the collections of R. R. Askew. – M. T. JENNINGS, 206 Lower Higham Road, Gravesend, Kent, DA12 2NN

REFERENCES

Cooke, P. 2011. BPGS Gall Recording at Wappenbury Wood and Old Nun Wood, Warwickshire, August 29th 2010, with *Andricus gemmeus* as a new County record. *Cecidology* **26**: 6–7.

Bowdrey, J. 2009. *Andricus gemmeus* (Giraud, 1859), a gall wasp (Hymenoptera: Cynipidae) new to the British Isles. *Cecidology* **24**: 34–37.

Bowdrey, J. 2011. An update on *Andricus gemmeus* in Britain. *Cecidology* **26**: 36–37.

Melika, G. 2006. Gall Wasps of Ukraine. *Vestnik zoologii* **21**: 305–644.

Mitroiu, M. 2013. Fauna Europaea: Hymenoptera in Ronquist, F. & Forsage, M. (eds.) *Fauna Europaea version 2.6.2*, http://www.faunaeur.org

COLLECTING BUTTERFLIES IN THOSE REMAINING STATES OF WESTERN EUROPE WHICH CURRENTLY DO NOT FORM PART OF THE EUROPEAN UNION AS AT 1st JULY 2013

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Introduction

When researching the background to my recent article on "The Sale of Lepidoptera in Britain" (Harvey, 2012) it became clear that with the changing composition of Europe and the probable future enlargement of the European Union, it will be increasingly difficult to know where exactly it is permissible to collect freely without unwittingly breaking the law and the dates from which any legislation take effect.

In all European Union Member States *The Conservation of Natural Habitats and of Wild Fauna and Flora* (Council Directive 92/43/EEC dated 21 May 1992), the Habitats Directive applies from the date of accession to the European Union by any specific Member State is fundamental. The date of July 1 2013 has been chosen to summarise the current position because Croatia acceded to the European Union on that date, becoming the 28th member.

This article deals with those western European countries currently outside the European Union. This paper excludes Albania and Turkey, both of which have aspirations to join the European Union, and the remaining individual States of the former Yugoslavia (Bosnia and Herzegovina, Macedonia, Montenegro and Serbia) not currently Member States of the European Union, together with various States of the ex-USSR on the Eastern borders of existing States of the European Union. There are language problems as well as substantially different legal systems in these countries making their inclusion impractical.

To make the geographical map complete, The Cape Verde Islands ceased to be part of Portugal in 1975, Gibraltar joined the European Union as part of the UK in 1973 and Greenland having joined the European Union as part of the Danish accession, left the Union on obtaining independence and self-government status in 1985.

Two Appendices have been prepared. Appendix A covers protected species in Liechtenstein, Norway and Switzerland, together with species also included in Annex IV (a) of the EU Habitats Directive and those granted full protection in the UK by the Wildlife and Countryside Act 1981. Appendix B gives details of permits required in these States and International Conventions (treaties) designed to protect fauna in those States signed by them.

Commentary on each state

Andorra

There is legislation dealing with the collecting of Lepidoptera and to some extent the practice follows that currently understood to have been adopted in Spain.

The law on the care and protection of animals (which includes invertebrates) published in the Official Journal of Andorra and dated 30 June 1998 specifies that a permit must be acquired from The Department of Natural Conservation to collect

anywhere in the country. The current contact is Roger Caritg, Snow and Mountain Research Center of Andorra, Av. Rocafort, 21–23 Saint Julià de Lòria, – email: *rcaritg.cenma@iea.ad*). The Center processes applications on behalf of the Government of Andorra. When applying for a permit the dates and aim of the trip must be specified; there appears to be no distinction between collecting in conservation areas and other parts of the country.

Channel Islands (British Crown Dependencies)

(a) Alderney and Sark

There are no restrictions on collecting on the islands and even though there are local nature reserves they are covered by memoranda of understanding and have no legal status. Although Alderney is a signatory to the Convention on International Trade in Endangered Species (CITES), no domestic legislation has been passed to protect species listed under that Convention.

Insofar as Sark is concerned there is currently no legislation on the subject except for the compulsory destruction of the larvae of *Euproctis chrysorrhoea* (L.) (The Brown-tail moth). However preservation of habitat and species is a live issue and draft legislation is before the Agricultural Committee of Chief Pleas, and which will probably cover *Melitaea cinxia* (L.) (Glanville Fritillary).

(b) Guernsey

There are no restrictions on collecting and there is no legislation covering invertebrates or habitat. There are "Sites of Special Significance" and "Sites of Nature Conservation Importance" but these have no legal protection. Many of the SNCIs are under the management of the local Natural History Society or the National Trust of Guernsey.

(c) Jersey

There is no legislation covering the collecting of Lepidoptera and there is no legal protection for individual species. There are Biodiversity Action Plans covering some invertebrates but not butterflies or moths. Collecting is also not banned on SSSIs.

Faroe Islands

There are no records of any butterflies on these Islands. However over 100 Macro and Microlepidoptera have been recorded. No legislation appears to exist covering collecting.

Greenland

Collecting of invertebrates is permitted provided resale is not intended. Visitors must obtain a permit from the Greenland Home Rule Authority to enter the National Park in North and East Greenland (Executive Order no. 7 of 17 June 1992 effective from 1 July 1992).

Five butterflies and 47 moth species have been recorded from the country.

None of the five butterflies, *Agriades glandon aquiline* (Staudinger), *Clossiana polaris* (Boisduval), *Clossiana chariclea* (Schneider), *Colias hecla* Lefebvre and *Lycaena phlaeas feildeni* (McLachlan) appears in Annex IV (a) of the EU Habitats Directive.

Iceland

Very little information is available despite numerous enquiries on the subject made to the Icelandic authorities.

However six butterflies and over 100 moth species have been recorded from the Island.

The butterfly species (2 Pieridae and 4 Nymphalidae) are all migratory, common and not protected elsewhere in Europe.

Isle of Man

Under their Wildlife Act 1990 the Manx authorities have protected only two moths, one macro and one micro, namely, the noctuid *Hadena caesia mananii* (Gregson) (The Grey) and the pyralid *Pyrausta sanguinalis* (L.), respectively. Protection of these two species extends to all stages of development and includes collecting and the sale thereof. There are Areas of Special Scientific Interest and Byelaws also exist applying to the National Nature Reserve and the Manx National Heritage conservation organisation which controls the collection of any Lepidoptera in those areas. Permission to collect in protected areas for scientific purposes should be addressed to Dr Richard Salmon, Senior Biodiversity Officer, Forestry, Amenity & Lands Directorate, Department of Environment, Food and Agriculture.

Liechtenstein

Butterflies protected by National or International law may not be collected in the Principality; in addition no collecting is permitted in protected areas such as SSSIs and National Parks.

Protected species are listed in Appendix A subdivided between those protected in Annex IV (a) of the EU Habitats Directive and those afforded National protection, 17 species in total. As with all legislation on this subject it applies to the capture of or taking invertebrates in any of their stages of development.

Monaco

No legislation has been enacted in the Principality covering the collecting or sale of butterflies or moths. However Monaco is a signatory to a number of International conventions including CITES which would affect the sale of specimens of *Parnassius apollo* (L.) (Apollo) and *Papilio hospiton* Guenée (Corsican Swallowtail) in the Principality.

Norway

Regulations exist covering various aspects of nature conservation and protection. A system of permits exists which are in some cases species specific and in others covering regions or terrain. There are four protected butterflies:

Coenonympha hero (L.) (Scarce Heath)

Parnassius apollo (L.) (Apollo)

Parnassius mnemosyne (L.) (Clouded Apollo)

Plebejus argyrognomon (Bergsträsser) (Reverdin's Blue)

and one on the prioritised (Red) list:

Scolitantides orion (Pallas) (Chequered Blue)

Information regarding the application for and issue of permits should be addressed in the first instance to the Section for Natural History at the Norwegian University of Science and Technology (information received from the Royal Norwegian Embassy in London). Email contact may be made via *kaare.aagaard@ntnu.no* or *helle-annfelt.hoverstad@dirnat.no*.

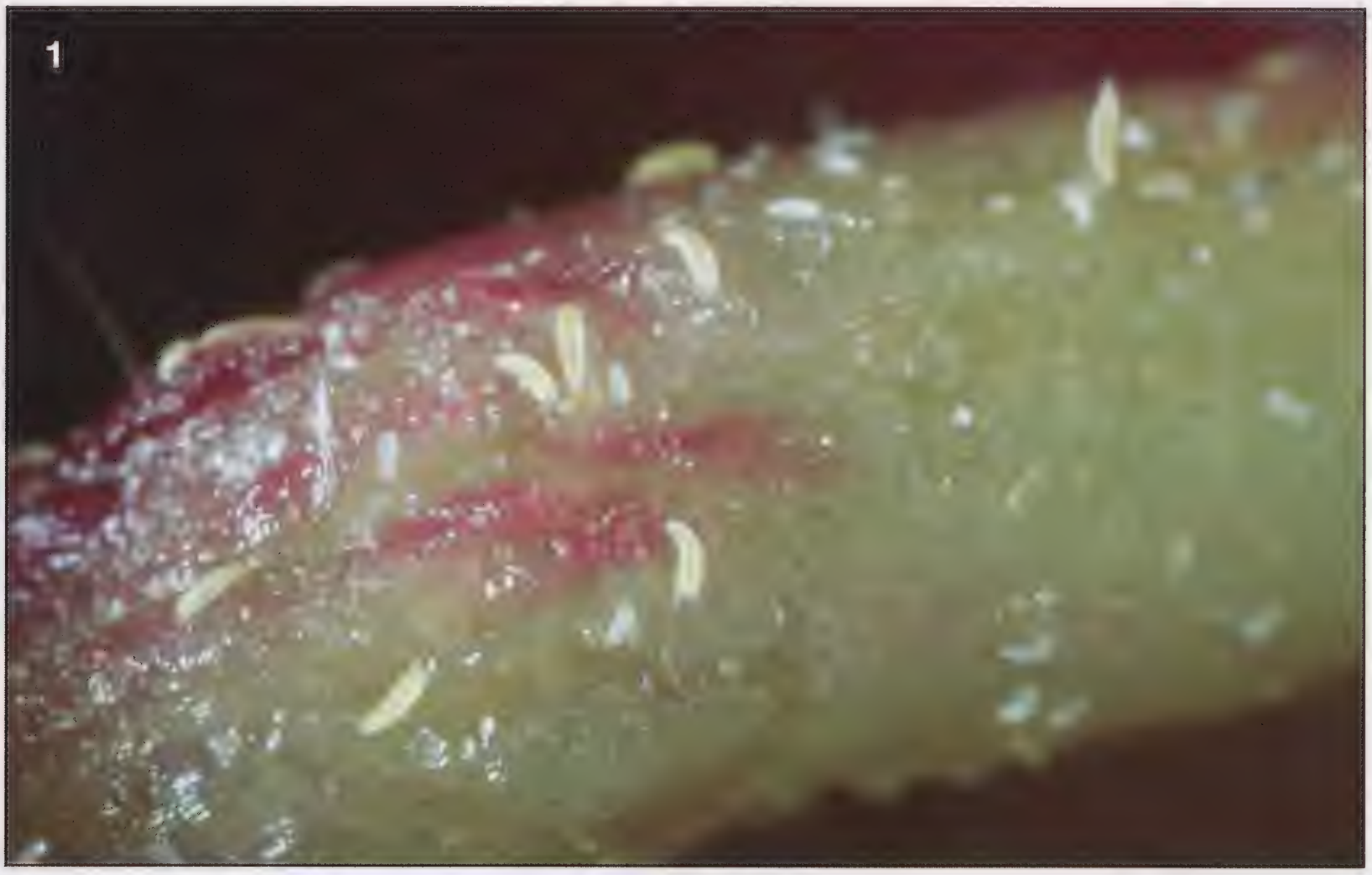


PLATE 9. Fig 1. Various life stages of *Aculops fuchsiae* Keifer feeding on the surface of a flower stalk. Adult mites reach 0.20 to 0.25 mm in length FERA©. Fig 2. Fuchsia gall mite *Aculops fuchsiae* galls at the green stage RHS©.

PLATE 10. Fig 1. Fuchsia gall mite *Aculops fuchsiae* galls at the red stage RHS©. Fig. 2 Green capsid bug *Lygocoris pabulinus* feeding damage on *Fuchsia* Fera©.

PLATE 11. Fig. 1. *Emus hirtus* on the Isle of Elmley, Sheppey, Kent, 1.vi.2013. Photo: Bob Gomes. Fig. 2. Agamic galls of the cynipid wasp *Andricus gemmeus* on oak, Cobham, Kent, 2012. Photo: M. Jennings.

PLATE 12. Fig. 1. Defoliation of ash trees in Cromwell Road, Aberdeen, 25.vi.2014. Photo: Andy Taylor. Fig. 2. Last instar green-coloured larvae of *Tomostethus nigritus* on ash trunk prior to pupation, Aberdeen, 25.vi.2014. Photo: Andy Taylor.

San Marino

No information is available from this Republic which is an enclaved microstate surrounded by Italy. Although not a Member State of the European Union it may be assumed to follow procedures in Italy which are outside the scope of this article.

Switzerland

This is a complex area to deal with. First, there is Federal legislation which deals with protection of the environment and prohibits the capture, killing, transportation and sale of butterflies and moths. Secondly, there is Cantonal regulation administered by the relevant nature conservation agency in each Canton which may afford additional local protection in addition to National protection. Apart from the Federal list of 23 species of butterfly and three moths, other species may be freely collected. Appendix A lists those species which are protected, divided between those which appear in Annex IV (a) of the EU Habitats Directive and those also afforded national protection.

More specific information may be obtained from Dr Mathias Lörtscher, Veterinary Office, International Affairs, Head CITES MA, Switzerland, email: *mathias.loertscher@bvet.admin.ch*.

Vatican City

The only area capable of supporting Lepidoptera in the Holy See, apart from passing migrants, is the gardens, which are the private preserve of the Pope and the Cardinals. Consensus of local opinion is that there would be no reason to legislate on this subject and permission to enter those gardens is rarely, if ever, given.

Disclaimer

Whilst every effort has been made to confirm the accuracy and validity of the content of this article, including statements made and opinions given, it must be stressed that this paper is the sole interpretation of the author of all the information received from official and other sources.

Acknowledgements

The author would like to thank all those whom he has approached to obtain information to enable him to complete this undertaking, including but not restricted to Government officials, Embassy and Consulate staff, University Professors and staff, Wildlife organisations and other colleagues.

References

Anon. 2008. The Conservation (Natural Habitats etc.) (Amendment) Regulations 2007. *Entomologists Record and Journal of Variation* **120**: 162–164.

Harvey, M. S. 2012. The Sale of Lepidoptera in Britain: a review of current legislation concerning the sale within Britain of protected species of European Macrolepidoptera. *British Journal of Entomology and Natural History* **25**: 137–142.

Phillips, J. W. 2008. European Community Legislation-Habitats Directive: advice on the integration of new legal restrictions affecting invertebrates. *British Journal of Entomology and Natural History* **21**: 81–86.

Appendix A

List of EU Habitats Directive Annex IV(a) species and protected species in Liechtenstein, Norway, Switzerland and the United Kingdom of Great Britain and Northern Ireland, covered by the Wildlife & Countryside Act 1981.

Species	EU Annex IV(a)	Liechtenstein	Norway	Switzerland	WCA 1981
Anthocharis cardamines		*			
Apatura iris		*			NS
Arethusana arethusa				*	
Apatura metis	*				
Argynnis paphia		*			
Carcharodus baeticus				*	
Chazara briseis				*	
Coenonympha hero	*		*	*	
Coenonympha oedippus	*	*		*	
Colias myrmidone	*				
Colias palaeno		*			
Erebia calcaria	*				
Erebia christi	*			*	
Erebia nivalis				*	
Erebia sudetica	*			*	
Eurodryas aurinia		*		*	*
Fabriciana elisa	*				
Hypodryas maturna	*				
Iolana iolas				*	
Iphiclides podalirius		*			
Leptidea morsei	*				
Limenitis camilla		*			
Limenitis populi				*	
Lopinga achine	*			*	
Lycaeides argyrognomon			*	*	
Lycaena dispar	*			*	*
Lycaena helle	*				
Maculinea alcon		*		*	
Maculinea arion	*	*		*	*
Maculinea nausithous	*	*		*	
Maculinea teleius	*	*		*	
Melanargia arge	*				
Mellicta britomartis				*	
Mellicta deione				*	
Nymphalis antiopa		*			
Nymphalis polychloros		*			NS
Nymphalis vau-album	*				
Papilio alexenor	*				
Papilio hospiton	*				
Papilio machaon		*			*
Parnassius apollo	*	*	*	*	
Parnassius mnemosyne	*		*	*	
Plebicula golgus	*				
Polygonia c-album		*			
Polyommatus eroides	*				
Pseudophilotes bavius	*				
Pyrgus cirsii				*	
Zerynthia polyxena	*				

NS: Not for sale in the UK.

Appendix B

States covered in this article with details of permits required and Conventions ratified

Country	Domestic Legislation	Permits required Species (SP) National Parks (NP)	Signatory to Conventions CITES 1.7.1975	RAMSAR Aug.1975	BERN 1.6.1982	BONN 1.11.1983	ALPINE 6.3.1995
Andorra	*	SP/NP		*	*		
Channel Islands	*						
Alderney and Sark	Pending	Pending	*				
Guernsey	SSSIs						
Jersey	Not for invertebrates						
Faroe Islands							
Greenland	*	NP					
Iceland			*	*	*		
Isle of Man	*	2 moths					
Liechtenstein	*	SP/NP	*	*	*	*	*
Monaco			*	*	*	*	*
Norway	*	SP/NP	*	*	*	*	
San Marino			*	*	Observer		
Switzerland	*	SP/Cantons	*	*	*	*	*
Vatican City				*	Observer		

COUNCIL AND OFFICERS' REPORTS FOR 2013

Council and its Meetings

The Council held seven meetings during the year, five at the Conway Hall in London and two at the Society's rooms at Dinton Pastures. Attendances at Council meetings have been consistent, averaging 15 members. Members of Council may be Honorary officers, serve on our various subcommittees or represent the Society on other committees.

The President, Glenda Orledge, has served her term of Office from 1st December 2012 (a slightly irregular term on account of the outgoing President, Tony Pickles' health) to March 2014. As Glenda completes her term of office we now welcome Claudia Watts as incoming President.

Council would like to thank Glenda for all her hard work and commitment to the Society. Under her leadership a new Honorary Secretary was recruited! She has instigated a new outreach sub-committee, has launched our BENHS Groups initiative, and has strengthened our student membership. We also have Glenda to thank for arranging our coming visit to Lundy this summer.

Beulah Garner took over the responsibilities of Honorary Secretary from John Muggleton from April 2013. She line manages the paid administrative assistant Rosemary Hill.

Membershp of the Society

John Muggleton resigned from Council after 23 years of service. Council duly noted his great length of service and commitment to the good work of the British Entomological and Natural History Society. Council wished him well in his future role as President of the Amateur Entomologists' Society.

Although 40 new members were elected, another 20 were struck off through non-payment of subscription, resulting in an overall reduction in membership from 847 to 838. At the end of the year, there were 717 ordinary members (including students), 11 corporate, 43 life, 12 honorary, 2 junior and 53 special life members. The latter include five members, H. S. Barlow, K. P. Bland, O. Leigh-Wood, A. R. Pickering and D. A. Trembath, who qualified for 'special life' status at the end of the year. The slight fall in membership must be balanced against an increase of 13 in the previous year. Although our membership is stable, Council is aware of the need to continue to attract new members, and in particular to engage with young people with an interest in entomology. To this end, Glenda Orledge has been instrumental in swelling our student ranks with recruits from several universities.

A new publicity leaflet is being designed by Michael Darby and the Outreach sub-committee to address both the need to recruit new members and to update the leaflet layout and content to reflect modern design and appeal.

The Pelham-Clinton Building

The Society's headquarters at Dinton Pastures, and its contents, are major assets for the Society. The Pelham-Clinton Building houses our collections and library, is used for workshops and meetings, including those of affiliated societies, and is used occasionally for social gatherings.

The Country Park's dragonfly logo on our external front wall was replaced by the Society's logo in May 2013. Council thanks Ian McLean for getting the logo designed and made; although he could not be there for the installation.

Wokingham Council, who administer the Country Park, tidied up the area in front of the building by removing the rocks and broken pallets.

Publications

During the year a reprint of *British Hoverflies* was published and the new edition of *British Soldierflies* is on the cusp of publication. *British Craneflies*, the Society's new book is nearing completion and is expected to go on sale during 2015. Thanks are due to all those who have undertaken the exacting tasks involved in bringing our publications to this stage.

Website

Our website is managed by Tony Prichard who aims to keep the website up-to-date with news and events of relevance to our membership. A website is also a valuable method of communicating with the wider entomological community, at home and abroad, and will in future certainly become an increasingly important asset and resource for the Society. Our Facebook page is increasingly used as a means of communication between members. There has been much discussion on updating the content of the web pages and also steps are being taken to produce a blog.

Programme of events

Many events are held for members and guests throughout the Society's year which starts with the AGM and Members Day. In 2013 the threat of heavy snow forced cancellation of the AGM and Members Day on March 23rd and the AGM was subsequently convened at Dinton Pastures on April 14th. Another major gathering of members is, of course, our Annual Exhibition, held in 2013 on 16th November, at Kempton Park Racecourse in Surrey. It was attended by 178 visitors, of which 143 were members. This year there was no Society dinner after the Annual Exhibition because no suitable venue could be found. This will certainly be put to rights in 2014 when, on November 8th, we shall be holding our Exhibition at the Conway Hall in Holborn, London.

There were 16 BENHS workshops held in 2013, four in the Angela Marmont Centre at the Natural History Museum and 12 at Dinton Pastures. A total of 180 participants attended these events. In addition, the tenth Coleopterists' Day was held at Oxford and the first Hemipterists' Day was held at Dinton Pastures. This is the first year of Mike Edwards' service as Workshop Organiser.

Field meetings

For many, the most enjoyable part of entomology and natural history is getting out in the field and observing, collecting and recording our chosen taxa in the company of like-minded people. The Society's Regional Meetings (co-ordinated by Claudia Watts), the Field Meetings (co-ordinated by Paul Waring), and the meetings of our affiliated societies provide these opportunities.

Attendance of the field meetings has been varied in the last year, and certainly over the last two years it has been down. Paul Waring has led some field meetings with three or four people and others with none. In the south of England the attendance has been higher. According to Paul, the three main contributing factors are:

1. Unfavourable weather of 2012 and the first half of 2013.
2. The advancing age of many of our stalwart members over the last 20 years who previously had attended field meetings; and are not being replaced; (younger persons tend to have joined the local moth groups and other local groups, though they do attend when we have joint meetings).
3. Finally, and possibly the most influential, is that most of the sites for which field meetings have been offered in the last few years are not well-known sites with an established reputation for unusual insects. Such well-known sites tend to attract larger numbers of people. Periodically Paul Waring circulates a request for field meetings to organisers from other organisations with local networks of people and this can help attendance.

The meeting on 'Invertebrates of the South West' held at Buglife's offices in Plymouth on Saturday 18th May was attended by 23 people. Talks included the state of Britain's moths, Oil beetles, the Sandhill Rustic, Invertebrates of hard-rock sea cliffs, the work of a Buglife entomologist and the growing need to eat insects; which was put into practice at the end of the meeting! Thanks to Claudia Watts and Andrew Whitehouse for organising this meeting.

The Glasgow meeting held on 31st August was attended by 22 people. It was hosted by Jeanne Robinson at Glasgow Museum, with talks on the Pallopteridae of Scotland by Graham Rotheray, *Armadillidium vulgare* at the edge of its range by Glyn Collis, grazing impacts in the highlands by Nick Littlewood, riparian beetles and land use change by Jenni Stockan and an entertaining talk on experiences gained when reintroducing a water beetle by Garth Foster, followed by a tour of the collections. The field meeting was postponed due to poor weather. Claudia Watts comments that 'It was good to have students attending the meeting and networking with other entomologists.'

In Paul Harding's 2012 report he finishes with the comment: 'Another eventful year; pity about the weather!' Well I'm afraid I cannot improve upon this statement as regards climatic forces but I can say categorically that the BENHS is moving forward dynamically and looks forward to a successful year of entomologising in 2014!

BEULAH GARNER
with contributions by other Council members

TREASURER'S REPORT
FINANCIAL YEAR TO 31st DECEMBER 2013

Over the year maintaining our charitable activities produced a surplus of £120,529. This was mainly due to a substantial legacy from our late member Barry Harper of Bristol. This was received late in the year; previously it had become necessary to draw £40,000 from our investments to cover operating costs. Since receiving the legacy this will now be returned to investments.

As in 2012 we received a positive revaluation of our investments, totalling £27,131. Investment income increased by approximately £800.

A grant from the Hering fund was made for £750. £1,000 was donated to Butterfly Conservation for their Moths Count project. An initial payment of £1,000 was made to the Amateur Entomologist's Society re the joint venture of maintaining the AES Bug Club.

The Society remains in a healthy financial state and we shall continue to endeavour to cover our charitable expenditure from income.

I would like to thank Roger Hawkins for his continuing work with subscriptions and Tony Pickles for his advice in preparing the accounts.

Thanks also to Alan Philips for the work he has done in the examination of the accounts.

A full set of accounts will be lodged at Dinton Pastures and may also be obtained on application to the Treasurer.

JOHN FLYNN

Statement of Financial Activities
for the year ended 31st December 2013

	Unrestricted Funds £	Restricted Funds £	Endowment Funds £	Total Funds 31.12.13 £	Total Funds 31.12.12 £
Incoming Resources					
Bequests and donations	127,988	–	–	127,988	20,989
Subscriptions	13,728	–	–	13,728	16,661
Investment Income	4,393	2,740	973	8,106	7,273
Trading Income	–	5,804	–	5,804	7,895
Sundry Income	–	–	–	0	1,526
Total Incoming Resources	146,109	8,543	973	155,625	54,794
Resources Expended					
Direct Charitable Expenditure:					
Cost of Journal & Distribution	12,909	–	–	12,909	13,435
Cost of Facility at Dinton Pastures	–	10,435	–	10,435	7,625
Members Meetings and Services	13,301	–	–	13,301	15,817
Library and Curation	1,459	–	–	1,459	1,268
Grants & Donations	2,000	–	750	2,750	–
Depreciation	4,901	2,696	–	7,597	7,696
	32,569	13,131	750	46,451	45,841
Other Expenditure:					
Management Costs	13,014	–	–	13,014	6,974
Trading Costs	–	763	–	763	3,982
	13,014	763	–	13,777	10,866
Total Resources Expended	48,346	13,131	750	62,227	56,707
Net Resources Before Transfers	97,763	(4,588)	223	93,398	(1,913)
Net Incoming/Outgoing Resources	97,763	(4,588)	223	93,398	(1,913)
Gains & Losses on Investments:					
Realised	–	–	–	–	–
Unrealised	14,675	9,191	3,264	27,131	12,823
Net Movement in Funds	112,438	4,603	3,488	120,529	10,910
Fund Balances Brought Forward At 1st January 2013	£114,963	£295,759	£30,497	£441,220	
Fund Balances Carried Forward At 31st December 2013	£227,401	£300,362	£33,985	£561,748	

Balance Sheet as at 31st December 2013

	2013 £	2013 £	2012 £	2012 £
Fixed Assets				
Tangible Assets		184,607		192,204
Investments		219,088		231,957
		403,695		424,161
Current Assets				
Stocks	13,215		13,978	
Debtors	4,330		6,700	
Cash at bank and in hand	143,169		1,629	
	160,714		22,307	
Creditors: amounts falling due within one year	2,660		5,249	
Net Current Assets		158,053		17,059
Net Assets		£561,748		£441,220
Funds				
Endowment Funds – Hering Fund		33,985		30,497
Restricted Funds – Housing Fund	198,746		199,947	
– Special Publications	100,853	299,599	95,813	295,760
Fund				
Unrestricted Funds:				
Maitland Emmet BENHS Research Fund	66,824		59,966	
General Fund	161,341	228,164	54,997	114,963
		£561,748		£441,220

Tangible fixed assets

	Leasehold Property £	Fixtures & Equipment £	Total £
Cost			
At 1 January 2013	188,736	112,470	301,206
Additions			
Disposals			
At 31 December 2013	£188,736	£112,470	£301,206
Depreciation			
At 1 January 2013	45,537	63,464	109,001
Charge for year	2,696	4,901	7,597
On disposals			
At 31 December 2013	£48,233	£68,364	£116,598
Net book values			
At 31 December 2013	£140,503	£44,106	£184,608
At 31 December 2012	£143,199	£49,006	£192,205

Investments

	2013		2012	
	M.V. £	Cost £	M.V. £	Cost £
Shell T & T	24,168	1,250	23,055	1,250
Unilever	29,908	248	28,570	248
M & G Charifund	90,264	20,238	75,252	20,238
Hendersons Bond	41,727	58,000	57,108	58,000
Architas Bond	33,020	38,500	47,971	38,500
	£219,088	£118,236	£231,956	£118,236

Unrealised gains arising in the year are shown in the Statement of Financial Activities.

Funds

Analysis of net assets between funds

	Tangible Fixed Assets £	Current Investments £	Net Current Assets £	Total £
Endowment Funds:				
Hering Fund		13,254	9,562	22,816
Restricted Funds:				
Housing Fund	140,503	77,513	55,919	273,935
Special Publications		39,334	28,376	67,710
Unrestricted Funds:				
BENHS Research Fund		26,062	18,801	44,863
General Fund	44,105	62,924	45,395	154,424
	£184,608	£219,087	£158,053	£561,748

These abbreviated accounts are extracted from the Trustees' Report and accounts, a full copy of which has been lodged at Dinton Pastures and is available to members upon application to the treasurer.

JOHN FLYNN

EDITOR'S REPORT

Volume 26 of the *British Journal of Entomology and Natural History* was published on time in four parts in March, June, September and December 2013. The volume length at 248 pages, was about the same as in the previous year.

Fifteen papers, 25 short notes and 11 field meeting reports, in addition to Society news were published during the year. There continues to be a significant and increasing imbalance between the size of insect Orders and the proportion of submitted articles. Only a single article on beetles and four on flies were published during the year despite the number of UK species of these two groups exceeding 11,000. This paucity most probably results from the successful launch some time ago of specialist journals catering for these two groups. Surprisingly few lengthy papers on Lepidoptera have been submitted in recent times despite this group being the most popular in terms of members' interests and the number of displays at our exhibitions. The most popular group based on published articles appears to be the Hemiptera (scale insects, aphids, leafhoppers, bugs) with a mere 1800 UK species. As editor I would prefer the journal to publish papers that more closely represent the full diversity of our insect fauna, particularly the larger Orders and thus to be of interest to as wide a readership as possible. A general article on the subject of 'Cabinets of curiosity' by Richard Jones was well received and resulted in a couple of follow-up articles.

There were 17 book reviews and three obituaries: of Paul Sokoloff, Eric Philp and Donald Humphrey, all kindly written by members of the Society.

Providing an Index to each Volume is vital and I again wish to thank David Young and Roger Hawkins for their meticulous work in listing the articles in the previous Volume by title, contributing author and species, each arranged by taxonomic grouping. They were helped by Peter Chandler, Andrew Halstead, Peter Hodge and Arthur Jones.

Proof readers have been very generous with their time and I wish to thank Phil Porter, Darren Mann, Adrian Knowles and Jolyon Alderman for their efforts. Thanks go to the Exhibition recorders, Aaron Jones, Sean Clancy, Richard Dickson,

Colin Plant, Peter Chandler, Peter Hodge, Alan Stewart and David Baldock for preparing the Annual Exhibition report. Our Exhibition photographer, Alec Harmer was put under extreme pressure on the day and is thanked for preparing the colour plates ably assisted by David Wilson. Most of the photographs used to adorn the front covers have come from contributing authors, which is a relatively easy way to select images, but I would like to thank Peter Maton in particular for continuing to supply excellent photographs to fill in the gaps.

Lastly I would like to thank those who kindly offered to act as referees.

JOHN BADMIN

CURATOR'S REPORT 2013

As reported last year it had been agreed that the repinning and labelling of the Coleoptera collection, as first envisaged in the report for 2008, would be funded from the bequest received from Andy Callow. An allocation of £12,000 was made, both to provide the materials required and to employ somebody to carry it out. This work began early in 2013 and has been effectively implemented to a high standard by Steven Williams, at the Oxford University Museum of Natural History. I am grateful to Darren Mann for organising and supervising this work. All specimens are being staged at a standard height using No. 6 Austerlitz pins, labelled with the name over which they currently stand and that they belong to the BENHS, and arranged according to the latest Duff 2012 Coleoptera checklist. This individual labelling will facilitate future handling of specimens and verification by specialists. A database has also been created listing all the species with the number of examples of each; after completion of the layout this will enable quick searching of the collection via computer.

By the end of 2013, 54 drawers containing 20,174 specimens had been curated and arranged according to the new checklist, each drawer having required approximately 2.5 days' work. These comprised the families (in present checklist order) Sphaeriusidae, Gyrinidae, Haliplidae, Noteridae, Hygrobiidae, Dytiscidae, Carabidae, Helophoridae, Georissidae, Hydrochidae, Spercheidae, Hydrophilidae, Sphaeritidae, Histeridae, Hydraenidae, Ptiliidae, Leiodidae, Silphidae, Staphylinidae, Geotrupidae, Trogidae, Lucanidae and Scarabaeidae. Those up to Staphylinidae have been returned to the Society.

At the 2013 Annual Exhibition a display was provided, including a progress report and an exhibit of selected drawers, contrasting those already completed with the original arrangement. This work began on the general Coleoptera collection, and it is hoped to extend it to the separate (30 drawer) Joy collection and the Hemiptera in due course, if funding can be made available to continue the work.

A collection of spiders has been donated by Syngenta (Jealott's Hill), and I am grateful to Ian Sims and Jon Cole for facilitating this acquisition, which is the first addition of spiders to the Society's collections. The collection was received in four wooden boxes, with liners housing specimen vials of spiders in alcohol, together with a card index of the data. The spiders were mainly collected in the 1970s, using pitfall traps, in agricultural fields as part of insecticide trials on cereals. Some of the specimens were collected by Jon Cole and were originally determined by Peter Edwards. This collection and the card index were passed in October to Chris Spilling, who kindly offered the services of himself and Peter Merrett to curate the collection and verify the identifications. Following the return of the collection its long term storage will be considered.

A small collection of Lepidoptera leaf mines, collected by the late Paul Sokoloff, was donated by his wife Linda. Some of them are named and may relate to reared specimens in his collection, which is to remain in his family, but this is not certain.

Five store boxes of miscellaneous insects, principally aculeate Hymenoptera and Diptera, were kindly donated by Mike Pugh. I am grateful to him and to Ivan Perry for a further significant donation of Diptera to the Society's collection. I also thank all other members who have donated specimens during the year, and Paul Harding for giving an Olympus microscope to the Society.

There has still not been any further progress in the amalgamation of the Society's Microlepidoptera into a single collection that began in 2007, and the Pyralidae and Tortricidae remain to be arranged. Work on this can now resume following the appearance of a new checklist of British Lepidoptera. It has yet to be considered to what extent reorganisation of the entire Lepidoptera collection, according to this new list, will be feasible.

It was mentioned in the two previous years' reports that a 12-drawer cabinet is available for sale to members. No interest has yet been shown in this cabinet, which has been advertised on the Society's website for the past year. This cabinet is not in perfect condition and has shallow drawers that require repapering, so a large sum for its purchase is not anticipated. Members interested in purchasing this cabinet should view it at the Society's building, and the first offer received will be accepted.

PETER CHANDLER

LIBRARIAN'S REPORT 2013

After last years' refurbishment of the library 2013 has been a year of consolidation. All our journals and books have been dusted and re-shelved and new shelf indexes compiled.

Some new journal titles have been added to our holdings this year: *Arachnology, The Newsletter* (of the British Arachnological Society), *Carolinea* and *Acta Entomologica Musci Nationalis Pragae* (exchange for Dipterist's Digest)

There was also a round of purchasing new books during the year. In the interest of brevity here I will produce a list of these for publication later in 2014.

During the autumn Peter Chandler, John Muggleton and I visited the house of the late Peter Dyte to assess his collection of journals that had been bequeathed to the Society. As a result, we brought two car loads of assorted items back to Reading, which I am currently cataloguing.

In conclusion, I would like to thank Jackie Rawlings, Glenda Orledge, Mark Mitchell, Malcolm Storey, Mike Pugh, David Gibbs and Roger Hawkins for donations of books and/or journals during the past year.

IAN SIMS

PRESIDENTIAL ADDRESS
PART 1: REPORT

GLENDA ORLEDGE

Department of Biology and Biochemistry, University of Bath, Claverton Down, Bath BA2 7AY

After the cancellation of last year's AGM and Members' Day at Oxford in response to the forecast of heavy snow, and the stormy weather and flooding of this year, I must confess that it is a relief to be addressing you all in person, on the appointed day and in the appointed place. I do hope that none of you has been too badly affected by the severe winter weather. Of course, it remains to be seen what will be the effects of this weather and its aftermath on populations of the organisms we observe and study.

Today and our Exhibition are major events in our Society's calendar. Together they demonstrate the strength and breadth of interest and expertise within the British Entomological and Natural History Society. This is something of which we can be justly proud, and which underpins our Society's diverse activities. During the last twelve months these have included the usual excellent programme of workshops, now organised by Mike Edwards, and a variety of indoor and field meetings, sometimes held in conjunction with other organisations.

One of the latter was the well-attended Brad Ashby Memorial Lecture held at the Natural History Museum, London, in September. Professor Jane Memmott of the University of Bristol treated a mixed audience of BENHS and London Natural History Society members to a fascinating talk about her work on urban pollinators. By way of contrast, our Special Meeting at the University of Bath last April attracted 21 students and 16 members and visitors. Thanks to the team of expert leaders and the enthusiasm of all participants, everyone enjoyed themselves and learnt a great deal from a combination of field and laboratory work. It would be good to try to repeat this success elsewhere. More recently, at the beginning of February this year, the Coleopterists' Day at Oxford attracted 64 people. What started as a BENHS initiative moved to Oxford when it outgrew the space we have available at Dinton Pastures and has morphed into a successful partnership between ourselves, this museum and the Biological Records Centre.

A total of 13 students joined us last year, of whom six joined at the Bath meeting. Two of them spoke to you this morning about their current work. In my report last year I mentioned the need to reach out to new natural historians and entomologists. Our Bath meeting has demonstrated how effectively we are able to do this. I hope that we can nurture the natural history and entomological interests of our new student members and keep them with us – both for their own sakes and for the future of field biology.

Outreach *is* important, and we now have an enthusiastic Outreach Committee which aims to bring our Society to the notice of others. During 2013 our outreach activities included manning a Society stand at the Natural History Museum's Big Nature Day in July and at the AES Exhibition in October. We shall do the same this year, and also look forward to a National Insect Week meeting at Dinton Pastures with the AES and the Berkshire Moth Group. Such events are most rewarding and very enjoyable. Do speak to myself or another committee member if you would like to get involved. I shall not forget a young boy at Big Nature Day – he couldn't have been more than 7 or 8 years old – who left our stand happily clutching a cardboard

sandwich wrapper on which I had hastily written the scientific names of some garden ants in response to his enthusiastic questions.

But we need to reach out to as many as possible of our members too! Our BENHS Groups initiative can help us to do just this – by providing a simple framework and support for members who would perhaps like to meet with others living locally, or with members who share similar invertebrate interests. We now have a Berkshire Group, a European Group and a Conservation Group. If you are interested in the possibilities that this initiative offers, then please talk to me or another member of Council and we will do all we can to help and support you.

In December I was pleased to be able to write to Henry S. Barlow, Keith P. Bland, Oliver Leigh-Wood, John Muggleton, Anthony R. Pickering and David A. Trembath, each of whom completed 50 years of BENHS membership in 2013 and therefore become Special Life Members. We thank these members for their loyalty and hope that they will be able to enjoy their new membership status for many years to come. Anthony Pickering recalls joining our Society with his father at the age of 13, whilst David Trembath's lepidopteran memories include collecting undescribed butterflies in Kenya.

Sadly we have learnt of the deaths of seven members since our AGM last year. Don Humphrey joined us in 1993 and was interested in Lepidoptera. Likewise, Special Life Members Neville Birkett and Joe Firmin shared a particular interest in Lepidoptera, with Joe Firmin also taking an interest in Coleoptera and Diptera. Another keen lepidopterist and member for 40 years, Anthony Dobson, died at the end of October. Alan Kennard writes of his friend, 'Dobbie': "We used to do the street lights going up the Marine Drive in Torquay. He was a great naturalist and enormously knowledgeable. He did all the identifications from the Rothamsted trap at Starcross and had only recently taken on the same task for the London Zoo trap. For many years he was in charge of environmental studies at Sparsholt College. He certainly knew his micros." Jackie Shane joined in 1994 and had a special interest in aquatic entomology.

Robert "Bob" George died peacefully in early November. A member since 1986, he was known to so many of us for his passionate interest in the Siphonaptera and as the founder and proprietor of Marris House Nets – the fairy logo of which reflects his considerable interest in hymenopteran fairyflies (Mymaridae). Bob served his country as a Spitfire and Meteor Jet fighter pilot during the Second World War before becoming a biology teacher and shifting the focus of his entomological interests from beetles to fleas. His initiation and leadership of the flea recording scheme resulted in the publication of his most recent flea atlas in 2008. David Nash, who joined us in 1971, died earlier this week. Suffolk beetle recorder for many years, he also made a substantial contribution to Wiltshire beetle records.

Entomology and our Society are the poorer for the loss of these members. I invite you all to stand for a minute in memory of these and all our late members.

Now we look forward to the coming field season, with personal excursions and Society meetings including our visit to Lundy. Also, Council is planning the refurbishment of our Collections Room at Dinton Pastures. Later this afternoon Claudia Watts will become our President and we have just elected several new Council members to replace those whose terms of office have expired. Officers and other Council members give generously of their time and expertise to our Society. Again this year, and on your behalf, I thank them all most sincerely, and extend a warm welcome to the new recruits.

Two members who are stepping down from Council this year deserve special mention. Tony Pickles has served continuously for 25 years. He has been our

Treasurer, Vice-President and President and continues as Chair of the Publications Committee and co-ordinator of our European Group. David Young has served on Council since the 1980s. He has been our Membership Secretary and compiler of our Journal Index for many years. Our grateful thanks to them both.

As I come to the end of my term as your President I thank all of you for giving me the opportunity to serve a society of which I am proud to be a member. It has been a privilege to serve as your President. Thank you.

SHORT COMMUNICATION

An outbreak of *Tomostethus nigritus* (F.) (Hymenoptera: Tenthredinidae) on Aberdeen's urban ash trees – The ash sawfly, *Tomostethus nigritus* (F.), has been recorded in northern Scotland for the first time. The species was first noticed in Aberdeen in 2013 but not formally identified until 2014 when an outbreak caused severe defoliation of many of Aberdeen's urban ash trees (*Fraxinus excelsior*) (Plate 12, Figs 1 & 2). The damage was concentrated on mature trees along two streets which form one of the main thoroughfares through the city. However, individual trees throughout the city also appeared to have been attacked. Though outbreaks occur frequently on the continental mainland, the phenomenon has only recently been reported in the UK; in Manchester in 2010 and Telford in 2014 (Tilbury, pers. comm.). Attacks on urban trees generally are not well documented but there are reports of outbreaks having occurred regularly in the Norwegian cities of Oslo, Kragerø and Fredrikstad (Austrara, 1991) and in Zagreb, Croatia, since 1997 (Matosevic , Hrasovec & Pernek, 2003). Generally the species persists at very low densities, being kept in check by parasitoids and environmental conditions. The triggers for outbreaks, in Croatia at least, are believed to be factors such as a late autumn and early spring floods. The appearance of the species so far north in the UK is intriguing; the only other published record of the species for Scotland being for Ayrshire in 1876 (Malloch, 1914). However, a similar species in North America, *Tomostethus multicinctus* (Rohwer) has also been expanding its range northwards. As an obligate ash feeder, *T. nigritus*, has been identified as one of a suite of species likely to be affected by the spread of ash dieback in the UK (Mitchell *et al.*, 2014). We thank Guy Knight and Christine Tilbury for comments. – J. A. Stockan & A. F. S. Taylor, James Hutton Institute, Craigiebuckler, Aberdeen, AB15 8QH.

References

Austrara, Ø. 1991. Severe outbreaks of the ash sawfly *Tomostethus nigritus* F. (Hymenoptera: Tenthredinidae) on ornamental trees in Oslo. *Anzeiger für Schädlingskunde, Pflanzenschutz, Umweltschutz* **64**: 70–72.

Malloch, J. R. 1914. List of Clyde Tenthredinidae (Sawflies). *Scottish Naturalist* **25**: 9–19.

Matosevic, D., Hrasovec, B. & Pernek, M. 2003. Spread and character of *Tomostethus nigritus* F. outbreaks in Croatia during the last decade. *In*: McManus, Michael L. & Liebhold, Andrew M., (eds). Proceedings: Ecology, Survey and Management of Forest Insects; September 1–5, 2002; Krakow, Poland. Gen. Tech. Rep. NE-311. Newtown Square, PA: U.S. Dept. of Agriculture, Forest Service, Northeastern Research Station. pp. 39–43.

Mitchell, R. J., Beaton, J. K., Bellamy, P. E., Broome, A., Chetcuti, J., Eaton, S., Ellis, C. J., Gimona, A., Harmer, R., Hester, A. J., Hewison, R. L., Hodgetts, N. G., Iason, G. R., Kerr, G., Littlewood, N. A., Newey, S., Potts, J. M., Pozsgai, G., Ray, D., Sim, D. A., Stockan, J. A., Taylor, A. F. S. & Woodward, S. 2014. Ash dieback in the UK: a review of the ecological and conservation implications and potential management options. *Biological Conservation* **175**: 95–109.

OBITUARIES

EDWARD CHRISTOPHER MOUNT HAES, BSc FRES
1930–2014

Edward Christopher Mount Haes, known to all as Chris Haes, was born in Bermuda on 1st February 1930. He spent the early part of his life in Australia where his interest in natural history was first kindled and he developed a particular enthusiasm for the Orthoptera, a group for which he would later become a leading expert in the UK.

Chris attended Wye College (University of London) and obtained a BSc in Horticulture in 1952, going on to work for the Sports Turf Institute. This was followed by a stint as a technical adviser for a commercial fertiliser company, before firmly establishing himself at the plant health service for MAFF, where he remained for many years until his retirement in 1987. During those intervening years, his interest in orthopteroid insects saw him become heavily involved in the national recording scheme, and he became the organiser for the Orthoptera Recording Scheme in 1977, editing the second edition of the *Provisional Atlas of British Orthoptera*, which was published in 1979 by the Institute of Terrestrial Ecology. Chris worked closely with Dr David Ragge and Mrs Judith Marshall from the Department of Entomology at the Natural History Museum. His work with Judith, and the illustrator, Denys Ovenden, culminated in the production of *Grasshoppers and Allied Insects of Britain and Ireland,* which was published by Harley Books in 1988 and was the first definitive work on this group of insects since Ragge's authoritative publication in 1965. After the sad loss of his wife, Jane, to whom he had been married for ten years, Chris moved to Cornwall and pursued his two great interests, entomology and gardening. He was a founder member of the Cornwall and Isles of Scilly Federation of Biological Recorders (CISFBR), and made a significant contribution to the wildlife recording of this region, regularly contributing to literature with publications such as the Cornish Biological Records No. 12 *Grasshoppers and Related Insects in Cornwall*, and worked closely with Adrian Spalding (editor) and Malcolm Lee on the first and second Red Data Books for

Cornwall and the Isles of Scilly. Chris was a member of the British Entomological and Natural History Society in the late 1980s.

Chris continued to coordinate the Orthoptera Recording Scheme for Britain and Ireland, providing regular updates through the Scheme newsletter and his column in *British Wildlife* magazine. His time at the helm of the recording scheme concluded with the production of a comprehensive set of updated distribution maps in the *Atlas of grasshoppers, crickets and allied insects in Britain and Ireland*, which he and Paul Harding prepared for publication in 1997, before handing over the reins to John Widgery.

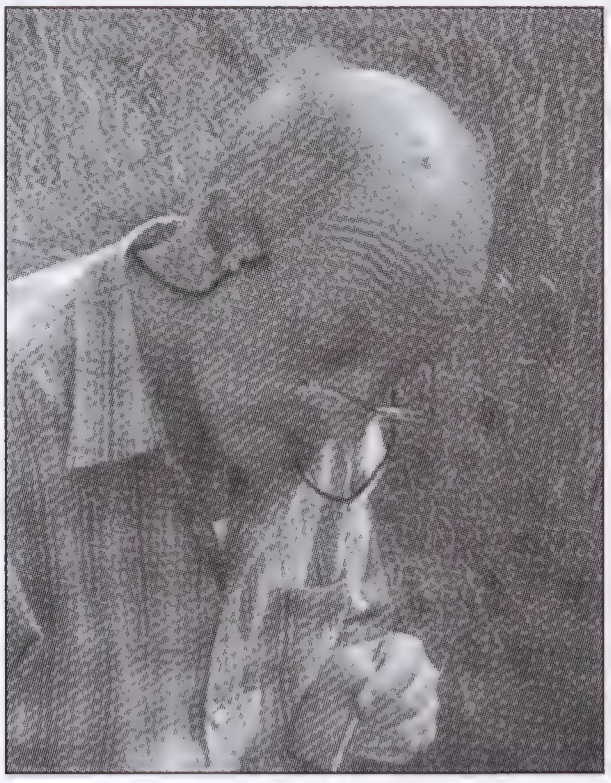
Chris had a wonderful ability to communicate through his writing, and wrote a number of other books including *Winter Colour in the Garden* (1965) and *Bulbs for Small Gardens* (1967). His flair for natural history writing was exemplified during his time as a leading figure in the Sussex Trust for Nature Conservation, when he produced the first authoritative natural history for the county of Sussex. *The Natural History of Sussex* (1976) was described at the time as being, "....abundantly illustrated, attractive...covers every aspect of the subject...written with verve, (and) it holds the reader's interest throughout." This publication, in essence, summed up Chris's all-encompassing approach to the study of natural history, and alluded to the overall connectivity and interdependence between animals, plants, and their habitats. Indeed, a common theme in many of the anecdotes provided by those who have enjoyed his company has been his impressive ability to find a species, explain with interest the other species that are likely to be associated with it, and subsequently point them out as they are discovered in the immediate vicinity!

On a personal level, Chris was an outstanding naturalist who was always ready to share his knowledge with others. His enthusiasm and willingness to support those who were interested in the natural world, particularly the world of entomology, was particularly evident through his correspondence, at the many field and society meetings that he led, and in the lectures that he delivered to various groups of horticulturalists and naturalists. I have often wondered what path I would otherwise have taken in the absence of that guidance and support, having first corresponded with Chris as a (bolshie) teenager regarding the discovery of a Field Cricket *Gryllus campestris* behind a sandy beach at Shoeburyness in Essex. As I progressed, eventually taking over from John Widgery as the Orthoptera Recording Scheme organiser, Chris always took the time to send his characteristic, enthusiastic and semi-legible postcards of support and encouragement whenever appropriate opportunities arose. It has been a privilege to walk in his footsteps. It is not an understatement to say that without his involvement, we may have lost one of our most recognisable harbingers of summer, the Field Cricket, and our detailed knowledge of native and introduced orthopteroid insects would be considerably less advanced.

Chris had a genial personality and a wicked, if not mischievous, sense of humour. He was fun to be with and as one of those rare 'all-rounders', his knowledge of horticulture and natural history will be sorely missed, as will his company. Chris died peacefully, aged 84, on 11th June 2014 at the Trewartha Care Home in Carbis Bay, Cornwall. In the words of one of his closest friends, "We are the richer for having known him." Malcolm Lee is thanked for providing the photograph of Chris inside the Humid Tropic Biome at the Eden Project, Bodelva, Cornwall.

PETER SUTTON

Anthony Hugh Dobson
1932–2013



Tony Dobson died on 31st October 2013 aged 80 years at home. He was a member of the Society from 1973 and regularly attended the annual exhibition and three to four field meetings a year.

He was born on 4th December 1932 near Winchester, Hampshire. He showed an interest in Lepidoptera from 8 years old, encouraged by his mother, to keep him occupied and out of mischief. When 12 years old, he was fascinated by a live Feathered Gothic *Tholera decimalis* (Poda) and decided to study and collect moths for the rest of his life. During the war the family moved to Torquay. In early September 1951 he had a hunch he would find a rare moth on ivy blossom on the Torquay coastline; on the 21st he found on ivy blossom at Walls Hill, the third British specimen of Blair's Mocha *Cyclophora puppillaria* (Hübn.). During his two years of national service in the army, he spent ten months on active service in Kenya with the 1st Battalion of the Devonshire Regiment. At Gilgil, when on duty clerk night duty, he would sleep in the C.O.'s room with lights on and the window open; early next morning he would rise, secure any interesting specimens, then gather the rest and release them outside before the C.O. returned. When on patrol, he always carried pill boxes as well as a rifle. A number of his butterflies and moths are in the foreign collection at the Natural History Museum, London.

After national service, he trained to be a teacher and taught in Primary Schools, where he organised natural history and insect study clubs. Through one of his pupils finding the second Devon specimen of Silver-striped Hawkmoth *Hippotion celerio* (L.), he appeared on Westward TV with it and other Hawkmoth specimens. In 1962, he found a colony of Devon Carpet *Lampropteryx otregiata* (Metcalfe) in a damp wood on Haldon Moor, Devon; he made a study of the wood, finding the moth's ova and larvae in the wild for the first time. He was macrolepidoptera recorder for Devon from 1962 to 1971.

In 1971 he and his family moved to Hampshire. From 1975 to 1976 he spent a sabbatical year in Sheffield gaining a Teaching Diploma in Environmental Studies. For relaxation he was out in the woods or on the moors and obtained a few moth aberrations, now in the national collection. In 1979 he left mainstream Primary Education to become a warden of a Field Studies Centre at Overton and then at Sparsholt College near Winchester. At both places he operated Rothamsted and M.V. traps, adding many records to the county list. He often took his Robinson M.V. trap to school grounds, so that children could study the contents next morning. At Clatford

Primary School he found an aberration of Burnished Brass *Diachrysia chrysitis* (L.), new to science and now in the Rothschild Cockayne Kettlewell National collection.

Tony was heavily involved in the Rothamsted Insect Survey which has been crucial in monitoring moth abundance and species diversity across the UK. He volunteered to help as far back as 1966 when he was approached by R. A. French to be an expert identifier for the trap at Slapton Ley NNR and also ran a trap at his school in Cullompton where he encouraged the school children to identify the moths and carry out investigations into moth activity and weather. After moving to Hampshire, Tony continued his association with the Survey identifying catches from Lordsfield, Stronchrubie, Ewingswode, Rosewarne, Broom's Barn, Starcross, Writtle and London Zoo.

Returning to south Devon in 1990 for a holiday, he visited one of his old mothing haunts on the coast where he found a colony of Bloxworth Snout *Hypena obsitalis* (Hübn.) and in subsequent visits made a study of its habitats and life history (*British Journal of Entomology & Natural History* 8 (1995): 37–42). His wife Meriel often accompanied him on field meetings and referred to the 3 'M's in his life – moths, maps and Meriel. He was always a keen field-worker and interested in conservation. In 1989 a paper of his on Lepidoptera foodplant recording for conservation was published in the Society's *Journal*, 2, 131–138. Since retiring in 1993 he worked on Hampshire Wildlife Trust reserves, studying and recording Lepidoptera. Throughout his life he painted and in his youth played the piano and became an Associate of the London College of Music (A.L.C.M).

ANDREW CLEAVE

H. G. MARK MIDDLETON

1940–2014

I first met Mark, who died in May this year, nearly forty five years ago on a visit to the New Forest in search of insects, and from that initial common interest we immediately struck up a friendship which lasted throughout his life. I well remember on that first occasion him showing me how to find some of the Forest rarities which occur round Brockenhurst.

Mark was one of nature's gentlemen; most people who met him immediately took to him; he was self-effacing, generous to a fault and blessed with a boisterous sense of humour, often at his own expense.

After graduating from Sparsholt College, Mark worked as a gardener, and his skill and dedication was known to many around the New Forest. Who, once privileged to see it, can forget the magnificently trimmed and arched hedge at the bottom of his own garden in Sandy Down near Lymington.

He did not have an easy life; perhaps scarred by events in his childhood he suffered from a severe stammer and was, on first acquaintance, shy and retiring as a result, although he managed his condition with unfailing good humour. Shy and retiring until he got to know you; from then on irrepressible! As Donald Russwurm used to say "Mark was such good fun!"

After his father left the family home and his elder sister Faith departed to live in America he took on the rôle of carer for his mother Eileen, denying himself opportunities to develop his own life. Despite this, Mark and Eileen enjoyed World travel for a few years and he had a vast knowledge of the many countries they visited. After his mother's death Mark moved the few miles to Brockenhurst and after a few years was to take on a similar caring rôle with his good friend and fellow collector, Donald Russwurm, the well-known butterfly artist.

Mark had a deep love of wildlife and the countryside, (except for conifers in the New Forest, against which he carried out a one man vendetta), and as a young boy was introduced to the hobby of collecting and studying moths by his neighbour Ann Robinson, wife of the co-inventor of the Robinson moth trap. Collecting butterflies and moths, although somewhat out of vogue these days, was to sustain him for most of his life. He became the butterfly and moth collaborator with Donald Russwurm and together they found many fascinating varieties and aberrations. For many years the only respite he had from looking after his elderly mother was his annual two weeks with Donald, when they would travel to the Lake District or Scotland in search of "good bugs". His friends grew to include a wide circle of like minded people from all over the country who made his and Donald's homes a regular calling point on their visits to the New Forest.

Mark was a keen supporter of our Society and until his health began to deteriorate made the annual pilgrimage to our exhibition in London where he was a frequent exhibitor in the 1970s and 1980s. A glance at the write-up of the Exhibition for any of these years will show him regularly exhibiting and having several of his insects photographed. Among the outstanding insects he took were var *flava* of the Rosy Footman *Miltochrista miniata* (Forster) in both 1981 and 1983, ab *lanceolata* Arkle of the Large Heath *Coenonympha tullia* (Müller) and a remarkable form of the Scarce Silver Y *Syngrapha interrogationis* (L.) exhibited in 1977. Our Society meant a great deal to him and Mark has remembered us handsomely in his will.

After Donald died in the year 2001 Mark was released from caring duties and for a few years his life flourished with collecting trips with his friends to Wales, Ireland and Scotland as well as the Far East, and frequent visits from his entomological friends. But unfortunately this was not to last for very long before his own health became an issue; he had to give up working and driving, and eventually even stopped running his moth trap. His interest in moths was not diminished however, and he still enjoyed regular jaunts to see his old entomological friends, and their reciprocal visits.

Mark has made a profound difference to many lives with both his generosity and generosity of spirit, and he will be missed by all who knew and loved him.

TONY PICKLES

REFERENCE

Proc. Trans. Br. ent. nat. Hist. Soc. 1970 to 1985.

FIELD MEETING REPORTS

University of Bath, Bath and north east Somerset, 20–21 April 2013

Both experts and novices gathered at this 'special' meeting with the aims of contributing to the campus species list and of providing novices with an introduction to the study of a variety of invertebrate groups. Twenty-one students (both undergraduate and postgraduate) representing six universities, 13 BENHS members and three visitors attended and were lucky to have some of the first good weather of the year. The sun shone for most of the weekend and temperatures reached the high teens. The weekend was divided into three sections: (i) initial talks (ii) field work and (iii) identification of collected specimens. Each fieldwork group (christened 'hunting party' by Toby Parkes) was led by a Society expert: Mark Telfer (Coleoptera), Mike Edwards (Hymenoptera), David Baldock (pan trapping, Fig. 1), Keith Alexander (saproxylic invertebrates), Matt Smith (fresh water invertebrates), Paul Waring (Lepidoptera) and Ray Barnett (biological recording).

On Saturday, before we set off into the field, keenly grasping our nets, pooters and field guides, each expert leader gave a 30 minute presentation to introduce their specialist group. Then fieldwork groups went their own way to explore the campus lake, woodland, meadows and formal plantings and the adjoining National Trust property, Bushey Norwood. After a few hours in the field, everyone returned to the laboratory to examine and identify the afternoon's haul of insects. Later, dinner on campus was gratefully and readily consumed by all and the evening was topped off by the setting of light-traps in an attempt to attract the resident moth population. After examination of the moth catch on Sunday morning, and comments on this by

Fig. 1. David Baldock setting out pan traps in formal plantings on campus.

Fig. 2. Attentive members and visitors in the laboratory on Sunday morning.

Paul Waring and Ian Sims, Ray Barnett presented a talk on the role of local museums in conservation and the value of historic biological records (Fig. 2). Fieldwork, specimen preparation and identification then continued until early afternoon and the end of the meeting.

Groups recorded were Coleoptera (60 species), Crustacea (14 species), Dermaptera (1 species), Diplopoda (5 species), Diptera (23 species), Ephemeroptera (1 species), Gastropoda (11 species), Heteroptera (14 species), Hymenoptera (24 species), Lepidoptera (20 species) and Oligochaeta (1 species).

Two personal perspectives on the meeting

(i) **Ainsley**: 'I have always been enthusiastic about the great outdoors and often explore my local surroundings. Currently I am studying at the University of Bath and when I heard that the BENHS meeting was being held on campus I jumped at the opportunity. The rewarding part for me, and for many others I am sure, was being in the company of the seven leaders and other BENHS members who attended the meeting. On jaunts of my own I often try to identify species and inevitably find myself with a shortlist of possible candidates. Being around those who could identify species with ease and provide tips on how to differentiate similar species was invaluable.

A personal highlight for me was accompanying Paul Waring and Ian Sims to the edge of the University's Lime Kiln Wood to set-up five moth traps. The deciduous

wood made for a low count, but for this novice it certainly seemed a good night's catch! We totalled 63 macro moths representing 11 species, with an additional seven oecophorid specimens. After setting the traps Paul and Ian spoke about moth-trapping and explained about moth phototaxis. This was followed by late night beating for larvae – sadly to no avail, but it was still fascinating to learn the technique. Ian Sim's DIY trap, comprising a white sheet, a few egg boxes and a 125W MBF/U light, attracted 15 moths. After seeing Ian's success with limited resources I have since set up similar traps with varying levels of success.

I would like to thank both Paul Waring and Ian Sims for giving me and the other students their time to explain and demonstrate various aspects of moth trapping. I am sure I speak for the other students as well when I say that the evening was insightful and has given us many tips for future meetings.'

(ii) **Toby:** 'As someone never before exposed to field entomology the weekend opened my eyes to an exciting new world, to which I was previously oblivious. As a consequence of this meeting I've found myself hooked, in common, I suspect, with some other participants, and I eagerly await new meetings to attend. I think this meeting was a great success. It brought new members to the Society, and introduced them to the exciting world of insects. I sincerely hope there are more meetings like this one to encourage new people into entomology.'

The weekend could not have happened without the expertise and help given by the leaders, so on behalf of all the participants our thanks to them all for their advice and guidance We also thank the BENHS members who provided sampling equipment and reference books which supplemented the books loaned to us from the BENHS library. The BENHS thanks the Department of Biology and Biochemistry at the University of Bath and the Head of School, Dr. Richard Hooley, for permission to hold the meeting on campus and for allowing us the use of a teaching lab and microscopes. Finally the biggest thank you for the weekend is to Glenda Orledge. On behalf of all the participants, we thank you for organising a most enjoyable meeting and for further sacrificing your time to act as door monitor!

AINSLEY HATT, TOBY PARKES AND CRAIG PERL

Hockwold, Norfolk, 18 May 2013

Leader: **Colin Hart**. – The plume-moth *Stenoptilia annadactyla* Sutter is known only from a limited area of Norfolk and Suffolk, and is easier to locate as a larva than as an adult. This event was organised to give local recorders, and any other interested members, experience of finding the larvae. The ideal time for first-brood larvae is during the first two weeks in May and the field meeting was originally planned for May 4th, but was postponed for two weeks because of exceptionally cold weather during March.

At 10.00h on a fine day six members gathered at the meeting point and proceeded to the site which is a wide ride between stands of pine on Forestry Commission land. After ten or fifteen minutes' search for the distinctive feeding signs we started to find larvae, ending up with about a dozen by the end of the morning. After lunch we moved on to Cranwich Camp and were rewarded by two larvae of Breckland Plume *Crombrugghia distans* (Zeller) near the car park, and several other species of Lepidoptera both as larvae and adults. The Spotted White Plume moth *Porritia galactodactyla* (D. & S.) has suffered a slow decline over the past century but was well

known from several areas of the Breck in the 1980s. A search of Linfold Carriageway turned up very little of the food plant, burdock, and no trace of any larvae.

A light-trapping session in Emily's Wood was planned for the evening and three members attended. Five lights attracted a good range of spring species, the most notable being two examples of The Tissue *Rheumaptera cervinalis* (Scopoli), several Water Carpet *Lampropteryx suffumata* (D.&S.) and the now almost ubiquitous Orange Footman *Eilema sororcula* (Hufnagel).

The leader would like to thank Neal Armour-Chelu of the Forestry Commission for permission to search for larvae and run light traps in the evening, and members of the Norfolk Moth Survey who publicised the event on their website and attended on the day.

Hampton Newt Reserve, Orton Pit, Peterborough, 11 June 2013

Leader: **Paul Waring**. – The main aim of this field meeting was to see if we could find the Concolorous Moth *Chortodes extrema* (Hübn.) at Orton Pit, on the south side of Peterborough, to add to the evidence that there is a resident population of this moth breeding on the site. The Concolorous is a Priority Species on the UK Biodiversity Action Plan. The moth was first recorded at Orton Pit by Peter Kirby in 2010 and he found more in 2011 (Waring, 2013). There are extensive stands of the larval foodplants Small-reed *Calamagrostis* spp. at Orton Pit. Over the same years the Concolorous appears to have been lost from Woodwalton Fen National Nature Reserve, some 10 km to the south. Woodwalton Fen has long been one of the major strongholds of the Concolorous, which is largely localised to the Northamptonshire-Cambridgeshire-Huntingdonshire area within the British Isles, with additional sites in Leicestershire and Lincolnshire (Waring, Townsend & Lewington, 2009). Wanderers and immigrants account for most of the other records shown in Hill *et al.* (2010), which are predominantly coastal. The leader reviewed the status and distribution of the Concolorous in the Peterborough area most recently in the Entomologists' Record (Waring, 2013).

In mid June 2013 we were struggling with overcast days in which it was difficult to find suitable conditions for day-time transect monitoring of the Four-spotted Moth *Tyta luctuosa* (D.&S.) and other day-fliers, and cold nights for light-trapping nocturnal moths. It was under these conditions we held this joint meeting between the British Entomological & Natural History Society (BENHS) and the Peterborough Biological Recording Group. The leader was joined by Andy Frost and Bill Last. Assisted by site manager Paul Furnborough, we set up two Robinson traps on a generator by large stands of *Calamagrostis*. The dusk temperature was 12°C, falling to 10°C by midnight, with light cloud and the lightest south-westerly breeze, which was just strong enough to wave the grass-heads. At 23.35h Bill Last saw a pale-coloured moth flit past him, netted it and it proved to be a Concolorous. We had seen no more by midnight, when each trap held only a handful of moths, and none of the target species, so we decided to pack up. An established population is the most likely explanation for this result, though we had hoped to see more individuals. I noticed that the ground on which the *Calamagrostis* grows here is much drier than any part of Woodwalton Fen which is now much wetter than even ten or twenty years ago due to its use as storage of nutrient-rich flood water. One indication of the enormous effect of this is the massive increase of Common Reed *Phragmites australis* (Cav.) Trin. ex Steud. which is much more predominant than when I first started working the Fen in the late 1980s. In many of the open areas reed and reed litter so dominates that it is suppressing all other plant life. The changes in hydrology and

reed growth, together with cutting and grazing regimes, almost certainly account for the apparent loss of the Concolorous from this National Nature Reserve. Large numbers were recorded there during a BENHS field meeting in 1989, including over 40 individuals in the south-east corner of the reserve, but in recent years none has been seen despite regular and appropriately-timed light-trapping sessions (Barry Dickerson, pers. comm.). Unfortunately, the Marsh Carpet *Perizoma sagittata* (F.) (Red Data Book species), and the Yellow Meadow-rue *Thalictrum flavum* L. on which it depends, appear to be being squeezed out and lost in the same way (personal observation and Alan Bowley, Site Manager, pers. comm.), but that is another story to report on in more detail another time.

For the record, the single Concolorous we saw at Orton Pit on this meeting was at TL 16500 94769 ±6m. The height of the ground at this point is 8m above sea level according to my Garmin GPS unit. Few other species of moth were seen on the wing and netted but these comprised a number of Green Carpet *Colostygia pectinataria* (Knoch) and Brimstone *Opisthograptis luteolata* (L.) and one Pale Prominent *Pterostoma palpina* (Cl.). The first of our standard-pattern Robinson traps with 125W MB/U bulbs was placed at TL 16423 94759 ±4m in an open sward rich in *Calamagrostis*. The seven species of macro-moth trapped here included Common Swift *Hepialus lupulinus* (L.), Flame Shoulder *Ochropleura plecta* (L.), Light Brocade *Lacanobia w-latinum* (Hufn.), Pale Prominent *Pteromstoma palpina* (Clerck), Shuttle-shaped Dart *Agrotis puta* (Hübn.), Straw Dot *Rivula sericealis* (Scop.) and Treble Lines *Charanyca trigrammica* (Hufn.). The second Robinson trap, at TL 16445 94686 ±3m in an open track through *Calamagrostis* trapped only five species of macro-moth before we packed up. These included a Pale Tussock *Calliteara pudibunda* (L.) and a Setaceous Hebrew Character *Xestia c-nigrum* (L.) in addition to a Common Swift, Flame Shoulder and a Treble Lines.

The leader would like to thank all who joined him and to note that Paul Furnborough remained on site after we had left, counting Great Crested Newts *Triturus cristatus* (Laur.) in the water by torchlight as part of on-going survey and monitoring work. We found a number of these newts were quite easy to see in the open water at this time.

References

Hill, L., Randle, Z., Fox, R. & Parsons, M., 2010. *Provisional atlas of the UK's larger moths.* National Moth recording Scheme. Butterfly Conservation. Wareham. Dorset.

Waring, P., Townsend, M. & Lewington, R., 2009. *Field guide to the moths of Great Britain and Ireland. 2nd edition.* British Wildlife. Milton-on-Stour. Dorset.

Waring, P., 2013. Concolorous Moth *Chortodes extrema* (Hb.) (Lep.: Noctuidae) in Peterborough and nearby during 2010. *Entomologists' Record & Journal of Variation* **125**: 133–135.

Borough Fen Duck Decoy, Newborough, near Peterborough, Cambridgeshire, 18–19 July 2013

Leader: **Paul Waring**. – This event was the fourth British Entomological and Natural History Society field meeting to be held on this site. An illustrated introduction to the site and reports of the previous meetings can be found in *BJENH* **26**: 55–58, 173–174 and 176–177. Mid to late July is the peak flight period for moths in this area and in these habitats, with numbers of individuals and numbers of species usually reaching their highest levels at this time. There was also a promisingly warm

evening forecast for the night. At dusk the air temperature was 22°C. The night stayed calm and dry and the minimum temperature was 12°C. Surprisingly, no-one joined the leader. This was not a problem and led to a peaceful, relaxed evening. A professional model Heath trap with 6W actinic tube was set up at TF 19972 08037 ±7m near Poplar trees of at least two species and was operated all night, but it was set within an unusually dry arm of the lake, under the netting of the decoy (Fig. 1). The aim of this was to have the trap visible to the lake edge and to any moths dependent on and flying around the emergent and water-edge plants. In the morning the trap was still in shade cast by the nearby trees. The trap contained 38 individuals of 18 species of macro-moths.

The two most numerous species were the Poplar Hawk-moth *Laothoe populi* (L.) and the Common Footman *Eilema lurideola* (Zinck.), at nine individuals each. Evidently the netting of the decoy had not proved to be a barrier to moths even as large as the Poplar Hawk. The next most frequent were the Uncertain *Hoplodrina alsines* (Brahm) (3 individuals), the Large Twin-spot Carpet *Xanthorhoe quadrifasciata* (Clerck) (2) and the Clouded Border *Lomaspilis marginata* (L.) (2). All the rest were singletons, of which the most localised were the White Satin *Leucoma salicis* (L.) and the Privet Hawk-moth *Sphinx ligustri* L. So even the largest resident British moth had probably come through the decoy netting.

The only butterfly seen during the visit was a Ringlet *Aphantopus hyperantus* (L.), but the sun was virtually set on arrival and only low on departure. A Grey Heron *Ardea cinerea* L. was seen quietly standing by the lakeside.

To increase the amount of moth data collected on this trip the leader operated a standard Robinson trap with 125W MB/U bulb at TF 19258 07659 ±6m all night on the Jacobs' farm adjacent to the Decoy, where mains electricity was available. The trap was actually placed in the vegetable plot near the farm-house. This trap was also still in the shade of hedgerow trees when inspected in the morning. There were undisturbed moths on the outside of the trap when it was inspected. The catch of this

Fig. 1. Actinic trap in netted horn of Borough Fen Duck Decoy. Photo: Paul Waring.

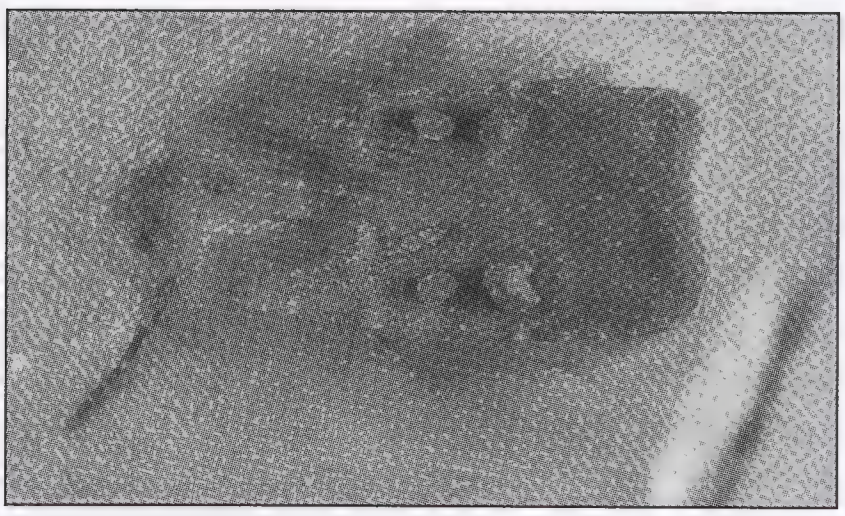


Fig. 2. Garden Dart *Euxoa nigricans*, Newborough, near Peterborough. Photo: Paul Waring.

trap was a respectable 557 macro-moths of 55 species. The most localised species for this part of the country included the Ghost Swift *Hepialus humuli* (L.), Cream Wave *Scopula floslactata* (Haw.), Small Dusty Wave *Idaea seriata* (Schr.), Grass Rivulet *Perizoma albulata* (D.&S.), Small Rivulet *Perizoma alchemillata* (L.), Dingy Shears *Parastichtis ypsillon* (D.&S.), Gothic *Naenia typica* (L.), Broad-barred White *Hecatera bicolorata* (Hufn.) and one Garden Dart *Euxoa nigricans* (L.) (Fig. 2). Although remaining a widespread and well distributed moth nationally, the Garden Dart declined in numbers by over 90% in the light-traps of the Rothamsted Insect Survey in the years between 1968 and 2002. It is very rarely seen at an identical trap I operate in my village garden in Werrington, Peterborough, just 5km to the south-west of the Decoy, and is infrequent locally. Most of the other species are seen virtually every year, usually frequently, in my Werrington garden.

The leader would like to thank the owners of the Decoy (Ann and Rodney Fletcher) and the site manager (Ivan Newton) for permission and facilitation of this meeting within the Decoy, and Judith Jacobs for her permission and help to trap on the adjacent farmland. The records have been supplied in full to the county moth recorders for vice-county Northamptonshire (John Ward assisted by Mark Hammond) which includes the Soke of Peterborough, now assigned to the modern administrative county of Cambridgeshire.

BOOK REVIEWS

Glowing, glowing, gone? The Plight of the Glow-worm in Essex by Tim Gardiner. 80pp. (British Naturalists' Association & Tim Gardiner, 2011). Available from BNA website, £8.00 p&p £2.00.

This book escaped the editor's net. The author describes an on-going survey of the glow-worm *Lampyris noctiluca* (L.) carried out by volunteers and members of the public in Essex since 2001. The importance of this book lies in the description of a simple sampling method and of ways to involve others in joining in a county-wide survey, so-called 'Citizen's Science'. Some preliminary results have already been reported in this journal (Gardiner, 2007). Coleopterists all too often regard the glow-worm as being 'common' or 'widespread' and when pressed have little hard

evidence to back up their recollections. With the advent of Local Record Centres and co-ordinated recording we now have a much better picture of the beetle's distribution and status and the species is far from being widespread (though records of course show it to be more widespread than many other beetle species).

The first few chapters describe the historical distribution and status of the glow-worm in Essex prior to the monitoring study. More recent data are discussed in later chapters and reveal that the species has suffered a 74% decline in numbers across Essex within the 10-year span of the survey. The distribution of the species has been similarly affected with several of the smaller populations going extinct. This is not my impression of the beetle's status in Kent, though we barely have any standardised figures with which to compare – locally I still see about the same number of glowing beetles on my walk back from the pub up in the woods today as I did 20 years ago, numbers having gone up as well as down.

The author's study once again highlights the real distinction between the results obtained by individual surveyors whose aim is to record species richness and those who monitor changes in species abundance over time: both are needed to monitor how our wildlife is faring.

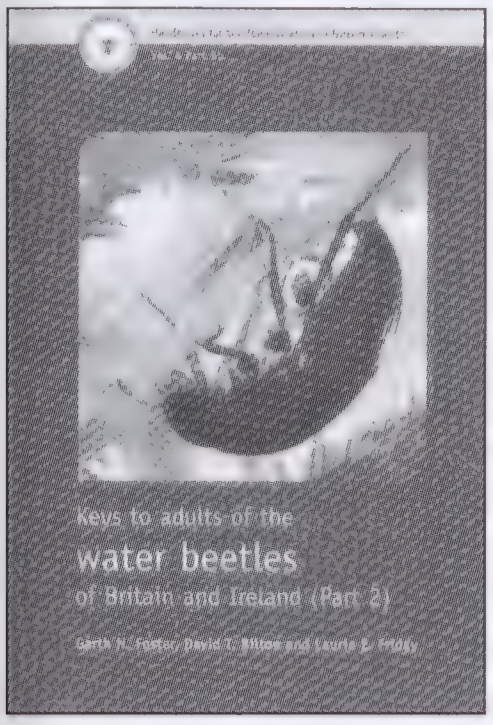
In the final chapters the author reports that there have been at least two apparently successful translocations of glow-worms in England. In each case these translocations were very much a 'last resort' option and are described in detail . One was a summer larval translocation in Essex and the other was a turf translocation of glow-worm habitat that took place in November near Tewkesbury. There is also a section on the status of the glow-worm in relation to planning law. Unfortunately this charismatic species is not yet legally protected but it clearly benefits from an unusually high public profile.

JOHN BADMIN

REFERENCES

Gardiner, T. 2007. Short-term changes (2001–2005) in glow-worm *Lampyris noctiluca* L. (Coleoptera: Lampyridae) abundance in Essex. *British Journal of Entomology and Natural History* **20**: 1–6.

Keys to adults of the water beetles of Britain and Ireland (Part 2) (Coleoptera: Polyphaga: Hydrophiloidea – both aquatic and terrestrial species) by Garth N. Foster, David T. Bilton & Laurie Friday. Handbooks for the Identification of British Insects. Volume 4 Part 5b. Published for the Royal Entomological Society by the Field Studies Council, 2014. 126pp. Softcover. £24.00. ISBN 978-0-90154-697-5.



This volume provides illustrated keys to the 65 aquatic and terrestrial species of the superfamily Hydrophiloidea which in Britain and Ireland comprises 5 families – Helophoridae (20 spp.), Georissidae (1 sp.), Hydrochidae (7 spp.), Spercheidae (1 sp.) and the Hydrophilidae (36 spp.).

Part 1, published 2011, covered aquatic members of the Adephaga – the Hydradephaga (153 spp.). Part 3, yet to be published, will complete the remainder which include troublesome species included in (amongst others) the Scirtidae, Elmidae, Dryopidae, Heteroceridae and Hydraenidae families.

The general format follows that of Part 1 and includes: a general introduction to the *Hydrophiloidea*, check list,

morphology, notes on dissection and collection methods. This is followed by the main content, 87 pages of very workable keys with accompanying explanatory illustrations and aedeagal details. The volume concludes with a helpful comprehensive glossary of references and finally 12 digitally photographed colour plates providing excellent representation of every species covered by this volume.

A slightly updated version of the key to families of all wetland beetles is repeated from Part 1, perhaps unnecessarily?

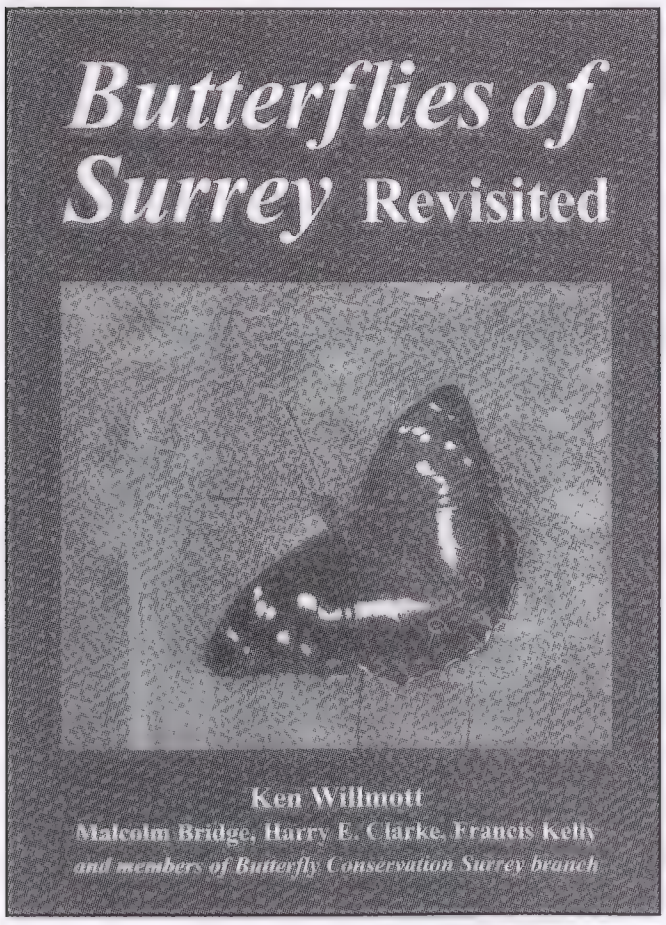
Of particular interest concerns two common species, viz. 2 forms of *Megasternum* have recently been recognised and a key for their separation is presented pending further investigation of all characters.

There also appears to be a likelihood that *Hydrobius fuscipes* (L.) comprises more than one species and this is discussed.

Mention is also made of another species – *Cercyon castaneipennis* Vorst – which has recently been described from the Netherlands. There is a suggestion that it might occur in southern England and although not separately included in the key, some comparison with similar species is outlined.

Not another water-beetle book – I can hear audible groans – indeed, I have to admit that probably was my initial reaction. However, after a full appreciation of the volume, I confess I have changed my views! Apart from it being the second updated volume of a modern 3-part series, the keys include all the 'terrestrial' *Cercyon* and *Helophorus* species. In addition the quality and detail of the new illustrations, especially of the aedeagi, are excellent and in my opinion eclipse any previous attempts I have seen. Surely the volume is worthy of purchase for these factors alone.

NORMAN HEAL


Butterflies of Surrey Revisited
Ken Willmott
Malcolm Bridge, Harry E. Clarke, Francis Kelly
and members of Butterfly Conservation Surrey branch

Butterflies of Surrey Revisited by K. Willmott, M. Bridge, H. E. Clarke, F. Kelly and other members of the Surrey and S. W. London branch of Butterfly Conservation. 240pp (Surrey Wildlife Trust, 2013). ISBN 978-0-9556188-4-0. £16.00.

This is number fourteen in the excellent Surrey Wildlife Atlas Project series and is an update of the original Butterflies of Surrey by Graham Collins, which was published in 1995, but is much more detailed and has the advantage of having a wealth of new data to draw on, amassed by a small army of volunteers sending in records to Butterfly Conservation's recording scheme. Although the intervening period is less than 20 years there have been many changes to the status of butterflies in that time, both in Surrey and other parts of the UK. Unfortunately, most of these changes have been negative and four species have been lost from Surrey in that time. Of the remaining 42 resident or regular migrant species, 24 have declined in abundance in the county since 2000.

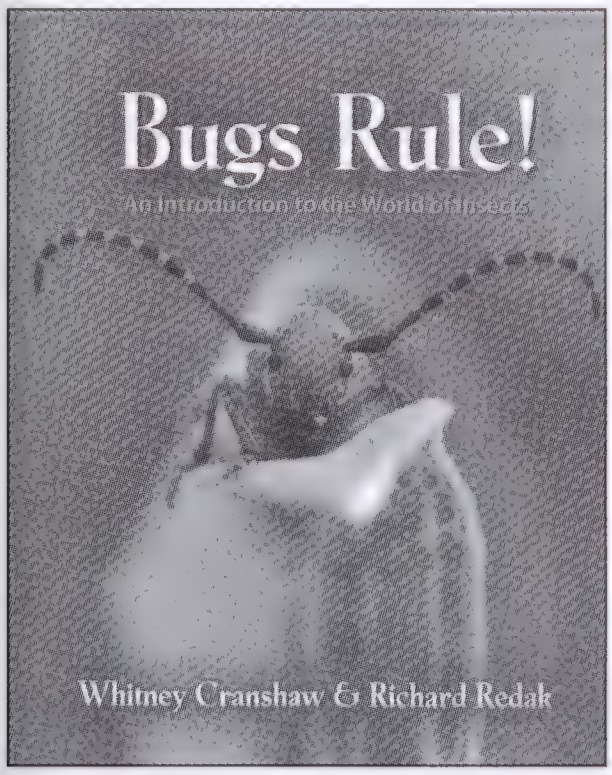
The authors demonstrate the changes in distribution and abundance by using coded maps that show sites where there have been gains and losses, and with graphs of abundance trends that utilise transect data. Transect data from the UK Butterfly

Monitoring Scheme (UKBMS) are also used to illustrate flight times and to highlight any changes in phenology that have occurred.

Information is also provided on identification, habitat preference, behaviour and life cycle. The personal observations of the authors on details of the life history are particularly useful, as some have not been published elsewhere. The book is well illustrated with good quality colour photographs. There is also a useful guide to the key butterfly sites in the county, with details of the species that can be observed there and the best parts of the site to see them, plus information of how to access the site by car, public transport or on foot.

My only minor quibble is that some non-specialists may find the maps slightly confusing. However, this is a fine addition to the books on the fauna and flora of Surrey and deserves to be in the libraries of naturalists, not only in that county but in other parts of Britain too.

MICHAEL EASTERBROOK



Bugs Rule! An Introduction to the World of Insects by Whitney Cranshaw & Richard Rednak. 480 pp. Princeton University Press, 2013. 830 colour photographs. ISBN 978-0-691-12495-7. Hardback £37.95.

Bugs rule, indeed, so we are led to believe. This is a university style textbook. It is interesting to learn that more entomology courses are run at American universities today than ever before, a sad reflection on our downgrading of the subject in the UK, where Imperial College, for so long Britain's focus for aspiring entomologists no longer sees fit to cover the subject. The first author, Whitney Cranshaw, is Professor of Entomology at Colorado State University and author of the magnificent *Garden Insects of North America* upon which the *Royal Entomological Society's Book of British Insects* by Peter Barnard is strongly based. Co-author, Richard Redak, is Professor of Entomology at the University of California, Riverside.

Bugs Rule was originally conceived to meet the needs of an entomology course taught to non-science undergraduates – the type of course where you have one chance to get across everything you need to know about insects to a group of students with little previous exposure to the subject. Although students rarely have the opportunity to take more advanced courses in entomology, it is always hoped that their initial exposure will open them to a lifetime of learning about the subject. The authors' intention has been to catch our eye and in this they have succeeded admirably as every page has at least one intriguing nugget of information with lots of superb photos and you can't help wanting to mention something you have read from the book to a colleague over a cup of coffee or more seriously to friends down the pub.

The authors have reviewed most of the main textbooks provided for students today making special mention of *The Insects: An Outline of Entomology* by Gullan and Cranston (now in it fourth edition), *Borror and DeLongs's Introduction to the Study of Insects* by Johnson and Triplehorn (now in its seventh edition) and for insect evolution and phylogeny the *Evolution of Insects* by Grimaldi and Engel. With

these in mind the authors have opted for a more natural history orientation – many of the basics are there such as anatomy, physiology, sysyematics, but these are given a fairly compressed treatment within introductory chapters, and later referenced as appropriate when specific insect groups are mentioned.

The main section of the book is an introduction to the various groups or orders of insects with emphasis on some of the more important species with respect to biology or economic importance. For example in the chapter on 'Scale-winged beauties and custom homebuilders' ie. the Lepidoptera, there are discussion boxes covering 'Butterfly or moth?', 'The amazing migration of the Monarch', 'Fatal attraction – moths to a flame' and 'Moths on vacation – migratng moths'. The various family groups are each covered in turn, for example the tussock moths and relatives with photographs of the Gypsy moth and its larvae and how the species was controlled before health and safety got a look-in! (see Fig.1). Perhaps a similar approach could be applied to limit the Processionary moth now spreading across London.

The book differs from most others in providing a fairly extensive treatment of non-insect arthropods – crustaceans, myriapods and arachnids, simply because many consider them to be 'bugs' even if they aren't in the strictest sense. To be fair the USA has a rather large proportion of these groups including a fair number of 'nasties' and students should be aware of what they are and how to identify them. If we in the UK believe we have a problem with quarantine regulations, the problem is much, much larger in the USA – for example the number of tick species introduced with the pet reptile and amphibian trade and the possible diseases they carry is a potential timebomb. The book also covers some more challenging topics such as 'Do insects feel pain?', 'Do insects sleep?' or even 'Bugs in ears' and whether spiders can enter your mouth while you are sleeping with your mouth open.

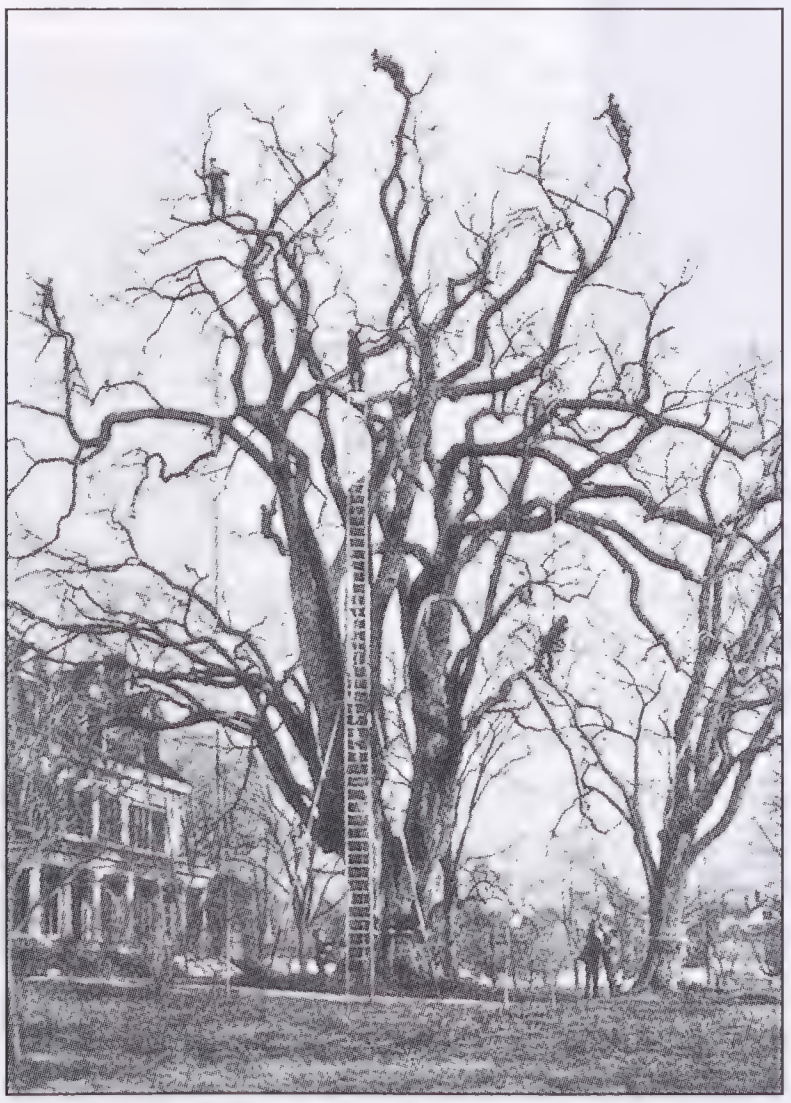


Fig. 1. An early effort to eradicate Gypsy moth, Malden, Massachusetts, USA. The moth was originally introduced into the nearby town of Medford in 1866, in the hope of using it to produce silk in the Northeast (alas the species produces very little silk but does like to eat foliage).

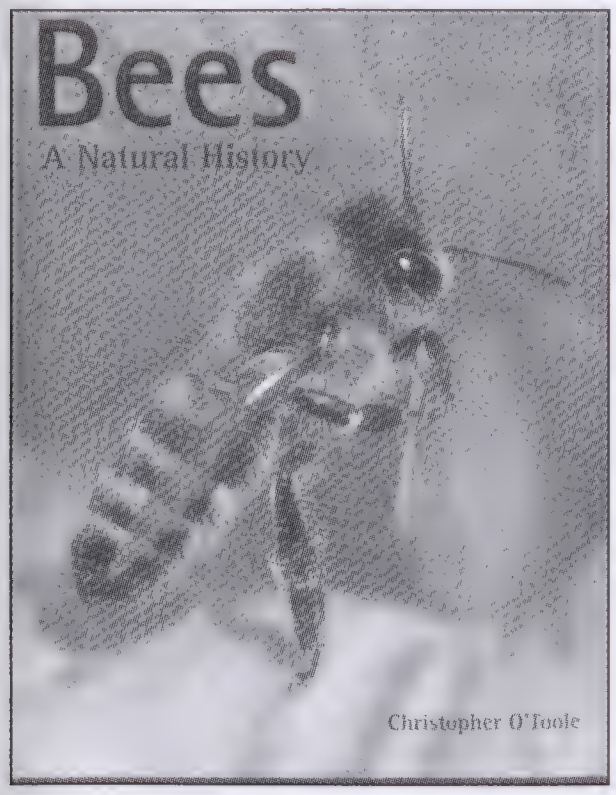
All in all this is a highly readable and entertaining book on bugs, with lots of superb colour photos and is highly recommended. to anyone who wishes to learn more about insect orders they are unfamiliar with. I still have two chapters to go. I admit my standard entomology text remains Richards and Davies '*A General Textbook of Entomology*' despite it now being taxonomically- and phylogenetically-challenged, but it does allow you to ponder such esoteric subjects as 'Compare and contrast the Zeugloptera, Monotrysia and Trichoptera: monophyly or polyphyly?' which some kind soul set us as an exam question I remember. By the way for those who wish to know, Zeugloptera was the order /sub-order name coined by Hinton (1948) for the Micropterygidae based on his detailed morphological studies of the group.

JOHN BADMIN

REFERENCES

Hinton, H.E. 1948. The dorsal cranial area of caterpillars. *Annals and Magazine of Natural History* **14**: 843–852.

Bees: A Natural History by Christopher O'Toole. Firefly Books, 2013. Hardback 240pp. £30.00. ISBN: 978-177085-208-2.



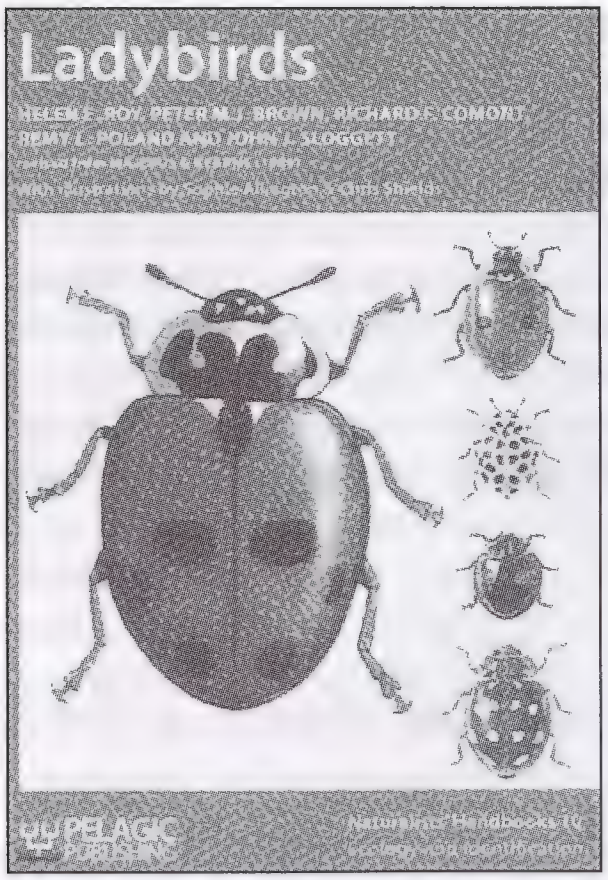
This beautifully illustrated book provides the reader with an excellent overview of the 18,000 or so recognised species of bee found across the globe. Those who restrict their study of bees to the rather depauperate fauna found in the UK are likely to have a very skewed appreciation of the group as a whole. The twenty tribes include the familiar Anthophorini (digger bees), Apini (honey bees), Bombini (bumble bees), Euglossini (orchid bees) and Meliponini (stingless bees) as well as the less familiar Exomalopsini (primarily neotropical) and Tapinotaspidini (neotropical, Meso-America).

Topics covered include a review of the relationship between bees and flowering plants: the importance of pollination, the collection of nectar and the role bees play in the continuing survival of many of our major crops. What is less well-known or even studied is the role bees play in the conservation of our own native wild plants. This is becoming an increasingly important issue as habitats in the UK continue to suffer from erosion and fragmentation: this needs the cooperation of both plant and insect conservation groups who never seem to meet.

There are sections on mating strategies, territoriality, mate competition and the role of scent. Other sections cover kleptoparasites and cuckoo bees: why Hymenoptera appear to be the only order that has taken to parasitizing its own in a really big way is still a big mystery.

The book is easy to read and a must for any serious student of the Hymenoptera. The author has been in the forefront of bee conservation in the UK for many years and here offers further good advice on how to reverse the declines recorded for many British species.

JOHN BADMIN



Ladybirds (2nd Edition) by Helen E. Roy, Peter M. J. Brown, Richard F. Comont, Remy L. Poland & John J. Sloggett. Pelagic Publishing, 2013. 142pp. Softback £19.99. ISBN 978-1-907807-07-7.

Many of us have watched this book emerge from the Cambridge University stable as the key reference work to the identification and study of ladybirds in the UK. Life before this was dull, with only a rather over-complex, black and white illustrated Royal Entomological Society Handbook on Coccinellidae (Pope, 1953) widely available for use (excellent diagrams, but a bit like describing the colour of snooker balls to those watching a snooker competition on black and white TV, for those who remember those happy days). Life became a bit more exciting with colour plates following instead of a second with the publication of the now sadly little-referred to Wayside & Woodland Beetles of the British Isles by Linssen (1959). Indeed all the ingredients were there for a fabulous book by the 1980s, and Mike Majerus and Peter Kearns finally achieved this with their publication of a proper colour guide to British ladybirds in 1989. This resulted in a massive increase in recording of ladybirds and a greater understanding of the species' distributions in the UK.

With the untimely death of Mike Majerus, the new team under lead author Helen Roy has accumulated a wealth of new information about the biology of our native ladybirds – in this case an extra 39 pages since the first edition. The book covers the 47 species species now resident in Britain and focuses on the 26 species most frequently encountered. Chapters cover the life history and distribution of ladybirds, colour variation, population and evolutionary biology and methods of sampling and recording. This book contains just about everything you need to know when trying to identify British ladybirds as well as providing interesting information about the biology of each species. Readers who wish to know more about the distribution and status of our coccinellids should refer to the recent atlas by Roy *et al.* (2011). By now you may have guessed this book is a must for anyone interested in entomology and Coleoptera.

JOHN BADMIN

REFERENCES

Linssen, E. F. 1959. *Beetles of the British Isles* (2 vols). London: Warne & Co.

Majerus, M. E. N. & Kearns, P. W. E. 1989. *Ladybirds*, No.10, Naturalists' Handbooks Series. Richmond Publishing Slough.

Pope, R. D. 1953. Coccinellidae and Sphindidae. *Handbooks for the Identification of British Insects Volume 7*. Published by the Royal Entomological Society.

Roy, H. E., Brown, P. N. J., Frost, R. & Poland, R. L. 2011. *The ladybirds* (*Coccinellidae*) *of Britain and Ireland. An Atlas of the Ladybirds of Britain, Ireland, the Isle of Man and the Channel Islands*. Published for the Biological Records Centre by the Natural Environment Research Council.

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Cover photograph: Final instar larva of the Peppered Moth *Biston betularia* (L.), Boughton, Kent 2014. Photo: Peter Maton.

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MICROHABITAT SELECTION BY MASQUERADING LEPIDOPTEROUS LARVAE

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ABSTRACT

The larvae of many species of Lepidoptera resemble inedible objects such as twigs, pine needles and bird-droppings. This strategy is known as masquerade (rather than mimicry or crypsis), and causes would-be predators to misclassify caterpillars as the inedible objects that they resemble. In the past five years, a number of studies have used twig-mimicking larvae of British Lepidoptera to investigate: how masquerade functions to deter predators; how the environment in which masquerading prey are found affects predators' responses to them; and how the microhabitat selection strategies of prey enhance the benefit of masquerade. Here, I briefly review this literature and present the results of two simple experiments that demonstrate that larvae of both the Brimstone moth *Opisthograptis luteolata* (L.) and the Peppered moth *Biston betularia* (L.) exhibit adaptive microhabitat selection strategies similar to those previously recorded in larvae of the Early Thorn moth *Selenia dentaria* (F.). This raises the intriguing possibility that this behaviour is widespread among twig-mimicking caterpillars.

INTRODUCTION

Masquerading animals have evolved striking visual resemblances to inedible objects found in the same locality (Endler, 1981; Allen & Cooper, 1985; Skelhorn, Rowland & Ruxton, 2010). For example, many species in the group Phasmatodea (stick and leaf insects) look remarkably like either sticks or leaves; the spider *Ornithoscatoides decipiens* O.P.-Cambridge closely resembles bird-droppings; and birds from the family Nyctibiidae bear an uncanny likeness to tree stumps. The use of masquerade is thought to be widespread across the animal kingdom (Cott, 1940; Skelhorn, Rowland & Ruxton, 2010; Brooker, Murray & Jones, 2011; Buresch *et al.*, 2011; Hoeksema & Crowther, 2011), and examples of masquerading animals have been found from as long ago as the early Cretaceous (Wedmann, 2010). Masquerade is particularly common among British lepidopterous larvae: at least 50 species are thought to resemble inedible objects at some point during their development (Skelhorn, Rowland & Ruxton, 2010). Here, I will briefly review how studying the twig-mimicking larvae of three of these species (the Brimstone moth *Opisthograptis luteolata* (L.); the Early Thorn moth *Selenia dentaria* (F.); and the Peppered moth *Biston betularia* (L.)) has been instrumental in establishing both how masquerade works, and how resembling an inedible object influences an animal's behaviour and ecology.

It has long been assumed that masquerade works by causing predators to misclassify prey as the inedible objects that they resemble (Endler, 1981; Allen & Cooper, 1985). Consequently, masquerade is distinct from both crypsis where an organism's visual appearance makes it difficult for predators to detect; and Batesian mimicry where an undefended organism's visual appearance causes predators to mistake it for a defended prey item (see Skelhorn, Rowland & Ruxton, 2010 for a

detailed discussion of the differences between these defensive strategies). However, until recently, this explanation had not been tested empirically. By manipulating predators' (naive domestic chicks *Gallus gallus domesticus* (L.)) previous experience of the inedible 'models' that the larvae resemble (twigs of the larval host plants) before presenting each predator with a single larva on a contrasting white background, my colleagues and I were able to show that predators detected masquerading larvae but mistook them for twigs. Predators that had previous experience with twigs were slower to attack twig-mimicking caterpillars compared with predators that had either had no experience with twigs, or predators that had experience only with twigs whose appearance had been changed so that they no longer resembled the caterpillars (Skelhorn *et al.*, 2010a; Skelhorn & Ruxton, 2011a). Predators with experience of twigs learned that they were inedible, and so took longer to attack the caterpillars because they misclassified them as inedible twigs: thus demonstrating that larvae of all three species benefit from masquerade even when presented against a contrasting background.

This does not mean that the backgrounds against which masquerading prey are viewed have no effect on predation rates. Indeed, a subsequent experiment found that the benefit of masquerade to *S. dentaria* larvae was significantly larger when they were found in the context in which predators had previously experienced twigs than when found out of context: predators that experienced twigs attached to branches were quicker to attack larvae found on leaves than larvae found on branches, whilst predators that had experienced twigs attached to both branches and leaves did not differ in the time to attack caterpillars found on branches and caterpillars found on leaves (Skelhorn & Ruxton, 2011b). There is also evidence that twig-mimicking caterpillars can gain additional benefits from crypsis when viewed against a background containing inedible models: naive predators have been shown to take longer to find *B. betularia* larvae when they are located on their own food plant than when they are found on an alternative plant species that they resemble less accurately (Skelhorn & Ruxton, 2011a). Although these studies suggest that the antipredator benefits of masquerade are larger when prey are located in environments in which their inedible models are present, there are also costs associated with being located close to examples of inedible models: when predators can view twigs and larvae of *S. dentaria*, they can directly compare the two, and are less likely to be fooled by masqueraders (Skelhorn & Ruxton, 2010). However, this is only true at very close viewing distances, and the benefits of being found close to inedible models are likely to significantly outweigh any costs (Skelhorn & Ruxton, 2014). Thus, taken together, these studies help to explain why twig-mimicking caterpillars tend to rest in twig-like positions on their host plants during the day (Dockery, Meneely & Costen, 2009) when visually hunting predators are active.

Intriguingly, not all branches on caterpillars' host plants offer them equal protection from predation. Predators are more likely to mistake *S. dentaria* larvae for twigs if they have previously experienced twigs of a similar size to the larvae, than if they have experienced twigs of a different size (Skelhorn *et al.*, 2010b). Predators can also quickly learn to use size cues to discriminate between twigs and *S. dentaria* larvae when the larvae are found on branches with twigs that are consistently smaller, or larger, than themselves (Skelhorn & Ruxton, 2013). Furthermore, it is not only branches with size-matched twigs that offer larvae greater protection from predation: branches with high twig densities offer more protection to *S. dentaria* larvae than branches with lower twig densities. This is because increasing the number of twigs relative to that of caterpillars both reduces predators' motivation to search for caterpillars and makes caterpillars more difficult to detect (Skelhorn *et al.*, 2011).

This may explain why some species of masquerading caterpillars have different morphs: by resembling birch twigs when found on birch branches and willow twigs when found on willow branches (Noor, Parnell & Grant, 2008), larvae of *B. betularia* effectively enhance their protection by decreasing the density of larvae relative to that of the twigs that they resemble (Skelhorn & Ruxton, 2011a).

Perhaps unsurprisingly, twig-mimicking caterpillars are able to select branches that enhance the benefit of masquerade: *S. dentaria* larvae preferentially select branches with size-matched twigs over those with size mismatched twigs (Skelhorn & Ruxton, 2013); and branches with high twig densities over those with lower twig densities (Skelhorn *et al.*, 2011). However, the apparent complexity of caterpillars' decisions is surprising. In a series of simple experiments, leaves were removed from preferred branches so that they still provided larvae with optimal protection from predators but no longer provided them with the opportunity to feed. During the day, *S. dentaria* larvae continued to show a preference for the branches with size-matched twigs over those with size mismatched twigs; and for branches with high twig densities over those with lower twig densities. In contrast, during the night, the preferences of larvae were reversed: they showed a strong preference for the branches containing leaves (Skelhorn *et al.*, 2011; Skelhorn & Ruxton, 2013). Thus caterpillars prioritised avoiding predation over food at times when visually-hunting predators would likely be searching for them (i.e during the day), and they prioritised feeding over avoiding predation when visually-hunting predators were likely to be scarce (i.e at night). Furthermore, depriving larvae of food caused them to shift their preferences away from the branches that offered optimal protection from predators and towards branches that contained food: their increased need for food caused them to accept a greater risk of predation (Skelhorn *et al.*, 2011; Skelhorn & Ruxton, 2013). Finally, when we simulated predatory attacks on food deprived larvae, they shifted their preferences back towards branches with high twig densities and away from those with lower twig densities (Skelhorn *et al.*, 2011); but this manipulation had no effect on their twig-size preferences (Skelhorn & Ruxton, 2013). Thus there is some evidence that increasing the perceived risk of predation caused *S. dentaria* larvae to enhance their preferences for safer microhabitats.

These studies seem to suggest that masquerading prey have evolved complex state-dependent microhabitat selection strategies that allow prey to enhance the benefit of masquerade when it is most beneficial to do so. However, to date, such strategies have only been observed in one species, so it is unclear whether such behavioural adaptations are common amongst masquerading prey or restricted to larvae of *S. dentaria*. Here I investigate whether the only other organisms that have been empirically demonstrated to benefit from masquerade (larvae of *O. luteolata* and *B. betularia*) display microhabitat selection strategies similar to those used by larvae of *S. dentaria*.

Methods

Two experiments were performed, using the same methodology as Skelhorn *et al.* (2011) as described below. However, in place of fourth instar *S. dentaria* larvae, final (sixth) instar *O. luteolata larvae* (Experiment 1) and fourth instar *B. betularia* larvae (Experiment 2) were used. (Hereafter *Opisthograptis* larvae and *Biston* larvae respectively.) Both species are common in the UK and feed on a range of deciduous trees (Porter, 1997). They resemble the twigs of their host plant and have been demonstrated to benefit from masquerade (Skelhorn *et al.*, 2010a; Skelhorn & Ruxton, 2011a). The larvae were obtained from ex laboratory stock and were reared

in clear plastic containers. These were housed in a room lit by natural daylight between June and September, and larvae were provided with branches of freshly cut hawthorn (*Opisthograptis* larvae) or birch (*Biston* larvae) every other day.

Experiment 1

This experiment was performed in the room in which larvae were housed between July and September. Daytime measurements were taken between 10.00h and 14.00h (illuminated by sunlight only), and night-time measures were taken between 22.00h and 02.00h (illuminated by moonlight and starlight only). Each larva was individually placed (using a paint brush) into a clear plastic tank ($33 \times 18 \times 18$ cm) containing two hawthorn branches. The tank had a cling-film lid, and the floor was covered with clean white paper. A pencil line indicated the centre of the tank: one branch was placed 5 cm to the left of the line, and the other 5 cm to the right. Larvae were placed on the line facing neither branch and left for 30 minutes. The branch on which the larva was located was then recorded: larvae that were not located on a branch were removed from the analysis.

The two branches differed in the number of twigs they contained. Each branch was approximately 25 cm in length: one had 8 twigs (high twig density) and one had 4 twigs (low twig density). There were six treatments, in which the presence of leaves on each of the branches (as food for larvae), larval hunger levels, and the perceived predation risk were manipulated. This was achieved by removing leaves, depriving larvae of food and simulating predation. See Table 1 for details of each of the experimental treatments. Food deprivation was achieved by removing the leaves from the larva's host-plant 24 hours prior to the experiments. Predation was simulated by gently squeezing the larva with tweezers three times immediately before the experiment. Each of the six treatments was performed both by day and by night, creating a total of 12 experimental groups. There were 30 larvae in each experimental group (i.e. 360 in total). Each pair of branches was presented to only one larva, and the paper on the floor of the tank was replaced between every replicate.

Experiment 2

The methods used in this experiment were almost identical to those used in Experiment 1. There were three exceptions: *Biston* larvae were used in place of

Table 1. Table outlining the experimental groups. Open cells represent situations where larvae can optimise both feeding opportunities and protection from predation; shaded cells represent situations where larvae must choose either a branch that optimizes feeding opportunities, or one that optimizes protection from predation. These groups were repeated by day and by night. Experiment 1 used *Opisthograptis luteolata* larvae and hawthorn branches; and Experiment 2 used *Biston betularia* larvae and birch branches.

Experimental group	Leaves on branch with low twig Density	Leaves on branch with high twig Density	Food deprivation	Simulated predation
Both leaves	✓	✓	✘	✘
Both no leaves	✘	✘	✘	✘
High leaves	✘	✓	✘	✘
Low leaves	✓	✘	✘	✘
Low leaves fasted	✓	✘	✓	✘
Low leaves fasted & Predation	✓	✘	✓	✓

Opisthograptis larvae; birch branches were used in place of hawthorn branches; and larvae were given 60 minutes to settle rather than 30, because preliminary observations showed that *Biston* larvae took longer to select a branch than *Opisthograptis* larvae.

Results

Experiment 1

Opisthograptis moth larvae showed a preference for the high-twig-density branch in trials when both branches had approximately equal numbers of leaves, when both branches had no leaves, and when only the high-twig-density branch had leaves. This preference was shown both by day (Binomial test: $P<0.0001$, $n=27$; $P<0.0001$, $n=30$; and $P<0.0001$, $n=29$ respectively; see Figure 1a), and by night ($P=0.0357$, $n=28$; $P<0.0001$, $n=29$; and $P<0.0001$, $n=30$ respectively; see Figure 1b). Thus larvae were able to choose the branch that maximised both food and protection from predation in treatments in which it was possible to maximize both simultaneously.

The remaining results refer to treatments in which only the low-twig-density branch contained leaves. Thus larvae were forced to choose between a branch that provided foraging opportunities but poor protection from predation (the low-twig-density branch), and a branch that provided no food but more protection from predation (the high-twig-density branch). Larvae tested in the day showed a significant preference for the high-twig-density branch (Binomial test: $P<0.0015$, $n=27$) despite this branch offering them no food, whilst those tested at night showed a significant preference for the low-twig-density branch ($P<0.0001$, $n=30$). This shows that when food and maximising anti-predatory defence through masquerade conflict, *Opisthograptis* larvae act to maximise effectiveness of masquerade by day, but prioritise food at night.

During the day, larvae faced with this conflict between food and perceived predation risk were more likely to opt for the branch with food, if they had previously been food deprived than if they had not (Fisher's test: $P<0.0001$). However, there was no effect of food deprivation when tested at night ($P=1$). In both the day and the night, larvae that had been food deprived and subjected to simulated predation showed significantly stronger preferences for the high-twig-density branch (with no leaves) than larvae that had only been food deprived ($P<0.0001$; and $P=0.0002$ respectively). Thus larvae were flexible in their behaviour, and modified their habitat preferences in response to variation in their internal state (hunger) and their external environment (perceived predation risk).

Experiment 2

Biston betularia larvae behaved in a similar way to *Opisthograptis* larvae. They showed a preference for the high-twig-density branch in trials when both branches had approximately equal numbers of leaves, when both branches had no leaves, and when only the high-twig-density branch had leaves. This preference was shown both by day (Binomial test: $P=0.0003$, $n=27$; $P=0.0002$, $n=28$; and $P<0.0001$, $n=30$ respectively; see Figure 2a), and by night ($P=0.0014$, $n=30$; $P<0.0001$, $n=30$; and $P=0.0014$, $n=30$ respectively; see Figure 2b).

When forced to choose between a low-twig-density-branch with leaves and a high-twig-density branch without leaves, *Biston* larvae showed a significant preference for the high-twig-density branch by day (Binomial test: $P<0.0001$,

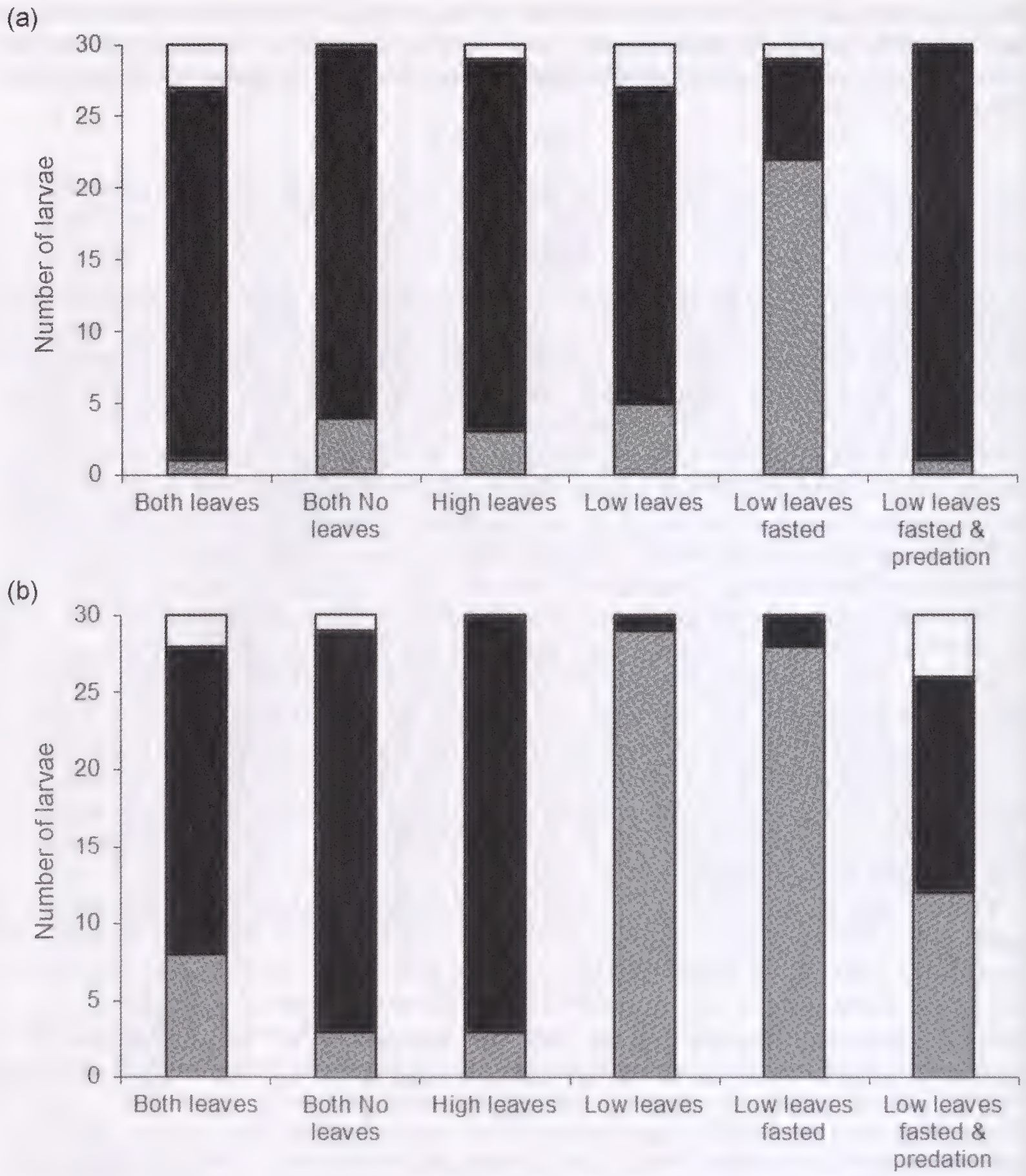

Fig. 1. The number of *Opisthograptis luteolata* larvae found on the low-twig-density branch (grey bars), on the high-twig-density branch (black bars), and on neither branch (open bars) in Experiment 1. (a) Larval choices made by day. (b) Larval choices made by night.

n = 24) and the low-twig-density branch by night ($P < 0.0001$, n = 30). Again, larvae faced with this conflict during the day, were more likely to opt for the branch with food if they had previously been food deprived (Fisher's test: $P < 0.0001$); and there was no effect of food deprivation when larvae were tested at night ($P = 0.2373$). In both the day and the night, larvae that had been food deprived and subjected to simulated predation showed significantly stronger preferences for the high-twig-density branch (with no leaves) than larvae that had only been food deprived ($P < 0.0001$; and $P = 0.0003$ respectively).

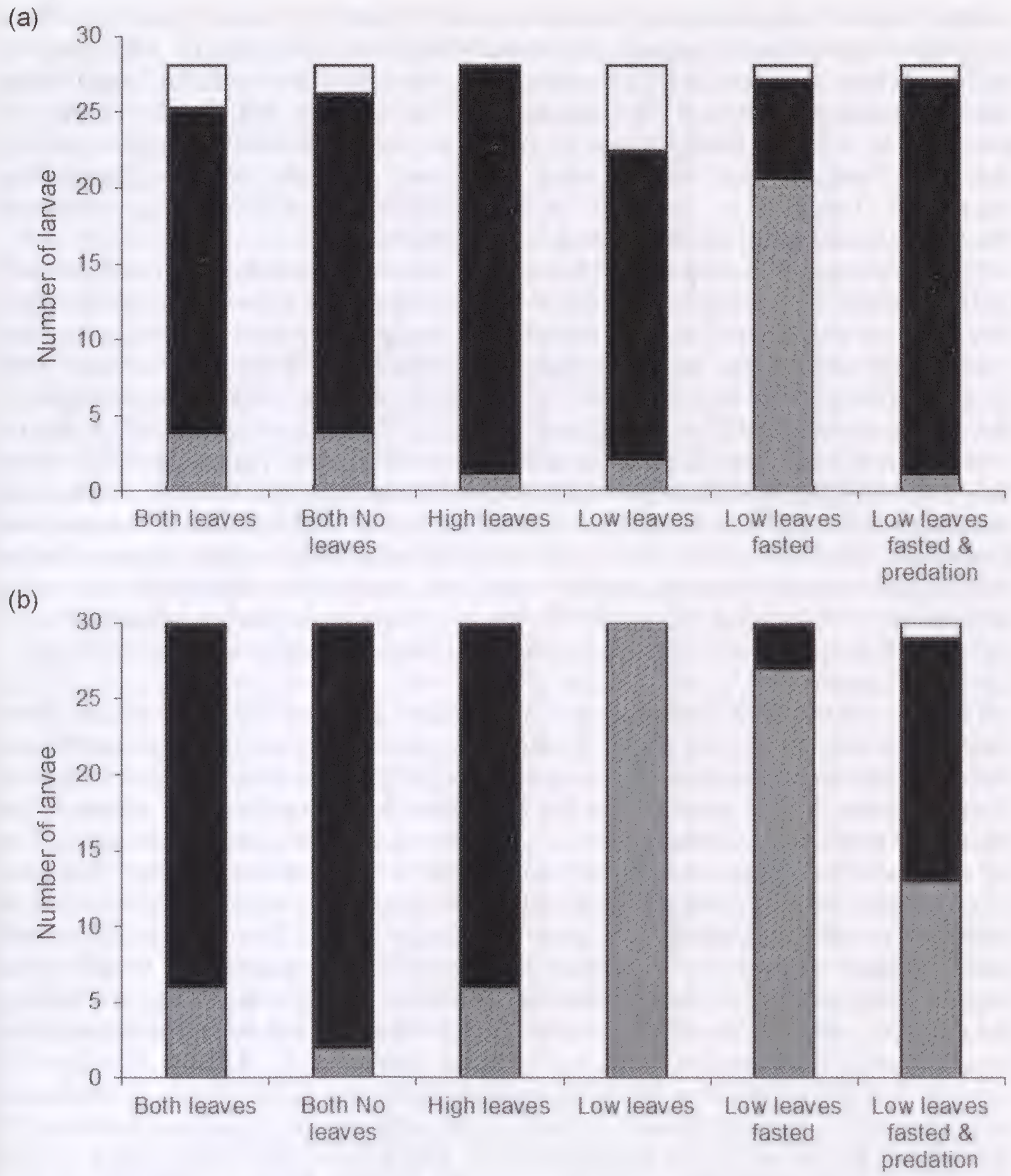

Fig. 2. The number of *Biston betularia* larvae found on the low-twig-density branch (grey bars), on the high-twig-density branch (black bars), and on neither branch (open bars) in Experiment 1. (a) Larval choices made by day. (b) Larval choices made by night.

Discussion

Larvae of both species were able to select microhabitats that provided them with both food and protection from predation when the two were compatible; and to trade off the relative costs and benefits of avoiding predation and feeding in a state-dependent manner when the two were incompatible. During the day, larvae preferentially selected branches with a high twig density, even when they contained no food. Previous work suggests that this behaviour will enhance the anti-predatory protection afforded by their twig like appearance: increasing twig

density makes twig-mimicking larvae more difficult to detect, and decreases predators' motivation to search for them (Skelhorn *et al.*, 2011). Furthermore, this behaviour was sensitive to time of day and was not seen by night when visually hunting predators are unlikely to be looking for larvae (Skelhorn, Rowland & Ruxton, 2010). These findings therefore, add further support to the idea that the diurnal microhabitat selection strategies of twig-mimicking caterpillars function to enhance protection from visually hunting predators (Skelhorn *et al.*, 2011; Skelhorn & Ruxton, 2013).

The behaviour of both species of larvae was also influenced by their internal state. During the day, food deprived larvae chose branches with a low twig density when they were the only ones to contain leaves. This can be interpreted as larvae accepting a higher risk of predation due to an increased need to feed. This is further supported by the fact that larvae that had been food deprived did not exhibit this preference if they had been subjected to a simulated predatory attack prior to the experimental trial: in this situation the increase in perceived predation risk caused larvae to select 'safe' microhabitats even though they had a heightened need for food. These findings are in line with a previous study that demonstrated similar behaviour in larvae of the *S. dentaria* (Skelhorn *et al.*, 2011); and more broadly, with studies demonstrating that animals reduce foraging activity when predation risk is perceived to be high (e.g., Kotler, 1984; Dill & Fraser, 1997), but are prepared to endure a higher level of risk if nutritional pay-offs are enhanced (e.g., Grubb & Greenwald, 1982; Pitcher, Lang & Turner, 1988).

To date only three prey species have been demonstrated to benefit from masquerade empirically: larvae of *O. luteolata*, *S. dentaria* and *B. betularia*. Taken together with the findings of Skelhorn *et al.*, (2011), there is now evidence that all three of these species possess similar behavioural adaptations that enhance the efficacy of masquerade. Since all three species are geometrids, this is not possible to say whether this is an example of convergent evolution or a shared common ancestor. This could be elucidated using comparative analyses, but it would first be necessary to establish whether a range of species benefit from masquerade, and possess similar behavioural adaptations. It would also be interesting to determine whether other aspects of these species' microhabitat selection strategies are similar. For example, whether larvae of *O. luteolata* and *B. betularia* show the preferences for branches with size-matched twigs exhibited by larvae of *S. dentaria* (Skelhorn & Ruxton, 2013); and whether all three species rely on the same sensory information and behavioural rules of thumb to make their microhabitat selection decisions. If caterpillars' decisions, or the mechanisms via which they make them, differ among species then this would add tentative support to the idea that adaptive microhabitat selection strategies have evolved independently in a number of masquerading species.

Future research could also consider whether other aspects of caterpillars' behaviour could influence the effectiveness of masquerade. The twig-mimicking larvae of one species not native to Britain, *Biston robustum* (Butler) possess cuticular chemicals that are similar to those found in the twigs of their host plant. They produce these by digesting the leaves of their host, and they are able to change their cuticular chemicals if their host-plant is switched (Akino, Nakamura & Wakamura, 2004). If leaves vary in their chemical composition, then caterpillars' foraging decisions may influence how accurately their cuticular chemicals match those of their host plant. Intriguingly, we do not know how the chemical cues of masqueraders influence the responses of visually-hunting predators (or whether such cues are found in other masqueraders). However, we do know that chemical and visual signals can interact to determine whether or not predators choose to sample/eat prey (Rowe &

Guilford, 1996; Rowe & Skelhorn, 2004; Rowe & Skelhorn, 2005; Skelhorn, Griksaitis & Rowe, 2008; Rowland, Ruxton & Skelhorn, 2013). It would thus seem reasonable to predict that the more similar the cuticular chemicals of a caterpillar are to that of its host-plant the more likely predators will be to mistake it for a twig. Alternatively, these chemicals may be distasteful or aversive to insectivorous predators and may consequently enhance the survival of prey by promoting post-attack rejection (Skelhorn & Rowe, 2005, 2006a, 2006b, 2007a, 2009).

We also have a lot to learn about how predators respond to masquerading prey. The example above illustrates that we know very little about how different signal components interact to influence the behaviour of predators (Rowe & Halpin, 2013). However, there are other major gaps in our knowledge. Researchers investigating other forms of anti-predator defence are beginning to take a broader dietary approach: asking under what circumstances predators should include defended prey in their diet (Skelhorn & Rowe, 2007b; Skelhorn & Rowe, 2010; Barnett, Bateson & Rowe, 2007; Barnett, Skelhorn, Bateson & Rowe, 2012; Halpin, Skelhorn & Rowe, 2012, 2013, 2014). This approach has not yet filtered through to the study of masquerade, and very little is known about how predators learn to discriminate between masqueraders and their models or how they make decisions about whether or not to search for masquerading prey. Perhaps even more surprisingly, no attempts have been made to test whether or not prey can benefit from masquerade in a natural setting.

In conclusion, I have demonstrated that larvae of both *O. luteolata* and *B. betularia* exhibit adaptive microhabitat selection strategies similar to those previously recorded in larvae of *S. dentaria*, raising the intriguing possibility that this behaviour is widespread among twig-mimicking caterpillars. More broadly, I have shown that studying British lepidopterous larvae has told us a great deal about how masquerade works, and how it influences the behaviour and ecology of prey. However, there is much more that they can tell us. Studies of masquerade have focused almost exclusively on understanding how the visual appearance of prey influences the likelihood of predators mistaking them for the inedible objects that they resemble. In future we should aim to determine whether prey are signalling in other modalities; how different signalling components interact to influence the benefit of masquerade; under what circumstances predators should include masquerading prey in their diets; and whether prey can benefit from masquerade in natural situations.

References

Akino, T., Nakamura, K. & Wakamura, S. 2004. Diet-induced chemical phytomimesis by twig-like caterpillars of *Biston robustum* Butler (Lepidoptera: Geometridae) *Chemoecology* **14**: 165–174.

Allen, J. A. & Cooper, J. M. 1985. Crypsis and masquerade. *Journal of Biological Education* **19**: 268–270.

Barnett, C. A., Bateson, M. & Rowe, C. 2007. State-dependent decision-making: educated predators strategically trade off the costs and benefits of consuming aposematic prey. *Behavioral Ecology* **18**: 645–651.

Barnett, C., Skelhorn, J., Bateson, M. & Rowe, C. 2012. Educated predators make strategic decisions to eat defended prey according to their toxin content. *Behavioral Ecology* **23**: 418–424.

Brooker, R. M., Munday, P. L. & Jones, G. P. 2011. Coral obligate filefish masquerades as branching coral. *Coral Reefs* **30**: 803–803.

Buresch, K. C., Mathger, L. M., Allen, J. J., Bennice, C., Smith, N., Schram, J., Chiao, C. C., Chubb, C. & Hanlon, R. T. 2011. The use of background matching vs. masquerade for camouflage in cuttlefish *Sepia officinalis*. *Vision Research* **51**: 23–24.

Cott, H. B. 1940. *Adaptive coloration in animals*. Methuen, London

Dill, L. M., Fraser, A. H. G. 1997. The worm re-turns: hiding behavior of a tube-dwelling marine polychaete, *Serpula vermicularis*. *Behavioral Ecology* **8**: 186–193.

Dockery, M., Meneely, J. & Costen, P. 2009. Avoiding detection by predators: the tactics used by *Biston betularia* larvae. *British Journal of Entomology and Natural History* **22**: 247–254.

Endler, J. A. 1981. An Overview of the Relationships between Mimicry and Crypsis. *Biological Journal of the Linnean Society* **16**: 25–31.

Grubb, T. C. & Greenwald, L. 1982. Sparrows and a brushpile: foraging responses to different combinations of predation risk and energy cost. *Animal Behaviour* **30**: 637–640.

Halpin, C., Skelhorn, J. & Rowe, C. 2012. The relationship between sympatric defended species depends upon predators' discriminatory behaviour. *PLoS One* **7 (9)**, e44895.

Halpin, C., Skelhorn, J. & Rowe, C. 2013. Predators' decisions to eat defended prey depend on the size of undefended prey. *Animal Behaviour* **85**: 1315–1321.

Halpin, C., Skelhorn, J. & Rowe, C. 2014. Increased predation of protein-enriched aposematic prey. *Proceedings of the Royal Society of London Series B*. **281**(1781): 20133255.

Hoeksema, B. W. & Crowther, A. L. 2011. Masquerade, mimicry and crypsis of the polymorphic sea anemone *Phyllodiscus semoni* and its aggregations in South Sulawesi. *Contributions to Zoology* **80**: 251–268.

Kotler, B. P. 1984. Risk of predation and the structure of desert rodent communities. *Ecology* **65**: 689–701.

Noor, M. A. F., Parnell, R. S. & Grant, B. S. 2008. A reversible colour polyphenism in American peppered moth (*Biston betularia cognataria*) caterpillars. *PLoS One* **3** (9), e3142.

Pitcher, T. J., Lang, S. H. & Turner, J. A. 1988. A risk balancing trade-off between foraging rewards and predation hazard in a shoaling fish. *Behavioral Ecology & Sociobiology* **22**: 225–228.

Porter. J. 1997. *The colour identification guide to the caterpillars of the British Isles* (*Macrolepidoptera*). Viking. London.

Rowe, C. & Guilford, T. 1996. Hidden color aversions in domestic chicks triggered by pyrazine odors of insect warning displays. *Nature* **383**: 520–522.

Rowe, C. & Halpin, C. 2013. Why are warning displays multimodal? *Behavioral Ecology and Sociobiology* **67**: 1425–1439.

Rowe, C. & Skelhorn, J. 2004. Avian psychology and communication. *Proceedings of the Royal Society of London Series B*, **271**: 1435–1442.

Rowe, C. & Skelhorn, J. 2005. Colour biases are a question of taste. *Animal Behaviour* **69**: 587–594.

Rowland, H. M., Ruxton, G. D. & Skelhorn, J. 2013. Bitter taste enhances predatory biases against aggregations of prey with warning coloration. *Behavioral Ecology* **24**: 942–948.

Skelhorn, J., Griksaitis, D. & Rowe, C. 2008. Colour biases are more than a question of taste. *Animal Behaviour* **75**: 827–835.

Skelhorn, J. & Rowe, C. 2005. Frequency-dependent taste-rejection by avian predators may select for defence chemical polymorphisms in aposematic prey. *Biology Letters* **1**: 500–503.

Skelhorn, J. & Rowe, C. 2006a. Avian predators taste-reject aposematic prey on the basis of their chemical defence. *Biology Letters* **2**: 348–350.

Skelhorn, J. & Rowe, C. 2006b. Taste-rejection by predators and the evolution of unpalatability in prey. *Behavioral Ecology and Sociobiology* **60**: 550–555.

Skelhorn, J. & Rowe, C. 2007a. Automimic frequency influences the foraging decisions of avian predators on aposematic prey. *Animal Behaviour* **74**: 1563–1572.

Skelhorn, J. & Rowe, C. 2007b. Predators' toxin burdens influence their strategic decisions to eat toxic prey. *Current Biology* **17**: 1479–1483.

Skelhorn, J. & Rowe, C. 2009. Distastefulness as an anti-predator defence strategy. *Animal Behaviour* **78**: 761–766

Skelhorn, J. & Rowe, C. 2010. Birds learn to use distastefulness as a signal of toxicity. *Proceedings of the Royal Society of London Series B*. **277**: 1729–1734.

Skelhorn, J., Rowland, H. M. & Ruxton, G. D. 2010. The evolution and ecology of masquerade. *Biological Journal of the Linnean Society* **99**: 1–8.

Skelhorn, J., Rowland, H. M., Speed, M. P. & Ruxton, G. D. 2010a. Masquerade: camouflage without Crypsis. *Science* **327**: 51.

Skelhorn, J., Rowland, H. M, Speed, M. P., De Wert, L., Quinn, L., Delf, J. & Ruxton, G. D. 2010b. Size-dependent misclassification of masquerading prey. *Behavioral Ecol.* **21**: 1344–1348.
Skelhorn, J., Rowland, H. M., Speed, M. P. & Ruxton, G. D. 2011. Density-dependent predation influences the evolution and behaviour of masquerading prey. *Proceedings of the National Academy of Sciences U. S. A.* **108**: 6532–6536.
Skelhorn, J. & Ruxton, G. D. 2010. Predators are less likely to misclassify masquerading prey when their models are present. *Biology Letters* **6**: 597–599.
Skelhorn, J. & Ruxton, G. D. 2011a. Mimicking multiple models: polyphenetic masquerading prey gain additional benefits from crypsis. *Behavioral Ecology* **22**: 60–65.
Skelhorn, J. & Ruxton, G. D. 2011b. Context-dependent misclassification of masquerading prey. *Evolutionary Ecology* **25**: 751–761.
Skelhorn, J. & Ruxton, G. D. 2013. Size-dependent microhabitat selection by masquerading prey. *Behavioral Ecology* **24**: 89–97.
Skelhorn, J. & Ruxton, G. D. 2014. Viewing distance affects how the presence of inedible models influence the benefit of masquerade. *Evolutionary Ecology* **28**: 441–455.
Wedmann, S. 2010. A brief review of the fossil history of plant masquerade by insects. *Palaeontographica Abtielung B – Palaophytologie* **283**: 175–182.

SHORT COMMUNICATIONS

***Buchananiella continua* (F. B. White) (Hemiptera: Anthocoridae) new to Oxfordshire**. – For a reason I can no longer recall, I decided on 17th October 2013 to go beating for insects on jasmine, *Jasminum* spp. (Oleaceae), in the back garden of my Oxford home (National Grid Reference SP510068). This unkempt shrub was mostly dead twig and yielded little apart from a small, dark anthocorid bug, which I was tempted to dismiss as the common *Cardiastethus fasciiventris* (Garbiglietti). However, I decided to take it as a specimen, and retired to the microscope in my study. There,

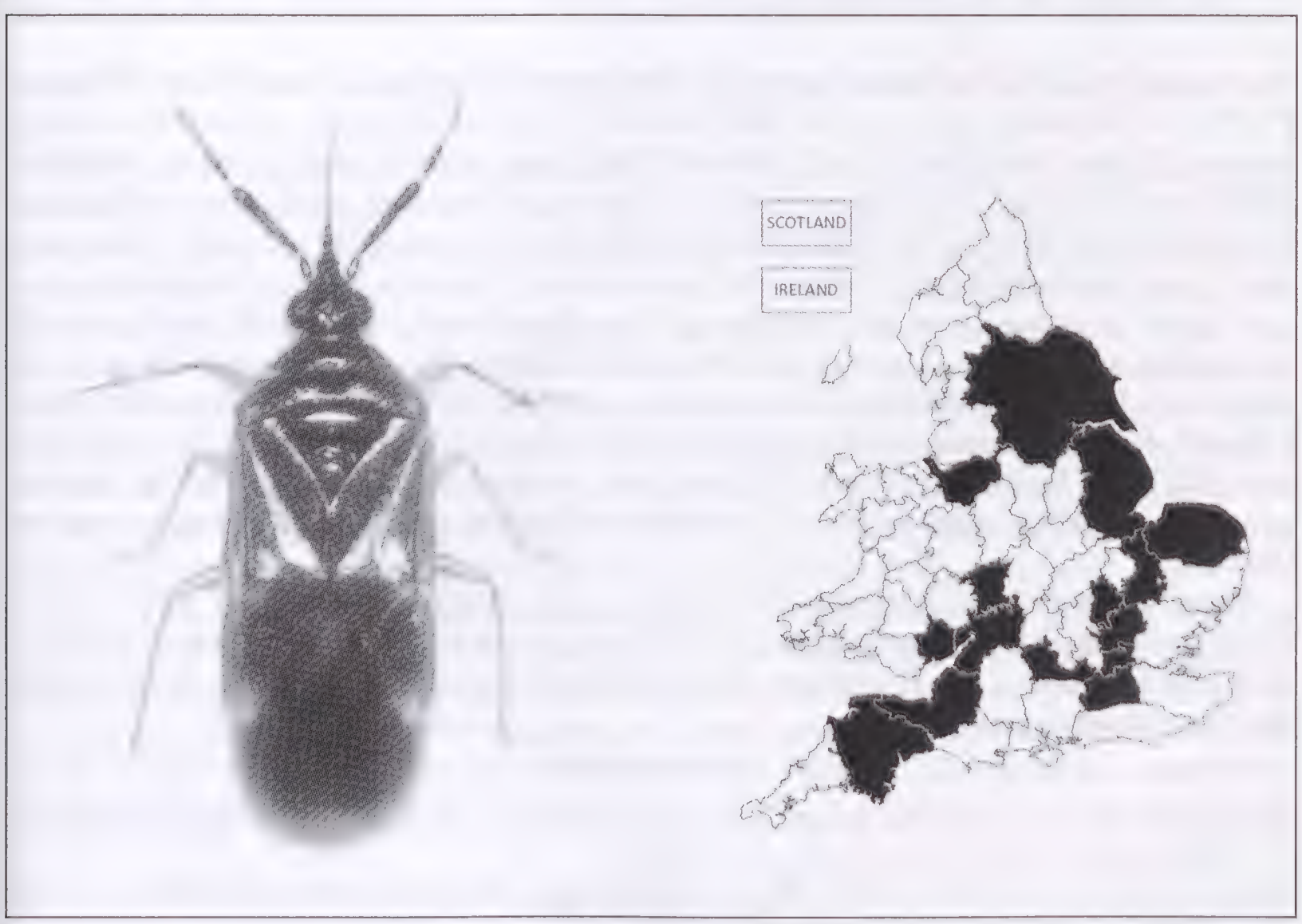

Figure 1. *Buchananiella continua* and its county distribution from the Atlas of the Hemiptera-Heteroptera of the British Isles (Ryan, 2014b).

I discovered that the insect was in fact *Buchananiella continua* (F. B. White), an insect which had not previously been reported from Oxfordshire. In an excited state, I returned to the garden and subjected the jasmine and the other shrubs in my garden, to a thorough thrashing. The search continued until my wife intervened. No more of the animal was found.

The following spring I was searching leaf litter in the graveyard of St Giles Church, a short distance from my home (SP511069), from which I obtained two more specimens of the insect, taking singletons on 14th and 19th March 2014. It is my habit, when examining leaf litter and moss, to filter off the fine debris using a kitchen tea strainer and pass it under the microscope. In this way I found these small, dark bugs, which would otherwise have been difficult to spot.

The insect was first reported as new to Britain by Kirby (1999) from specimens taken in Buckingham Palace Garden, Middlesex. In this, and several subsequent reports, the bug has been associated with dead plant material, in particular the fallen or cut-off branches of trees and shrubs. The new county distribution for the British Hemiptera-Heteroptera (Ryan, 2014a & 2014b) lists 15 counties from which *B. continua* has so far been recorded (Figure 1), to which can now be added Oxfordshire. – R. P. RYAN, 38 St John Street, Oxford, OX1 2LH (email: *RobRyanBugs@gmail.com*).

REFERENCES

Kirby, P. 1999. *Buchananiella continua* (B. White) (Hemiptera: Anthocoridae) established in Britain. *British Journal of Entomology and Natural History* **12**: 221–223.

Ryan, R. P. 2014a. The county distribution of the Hemiptera-Heteroptera of the British Isles, fourth edition. *Hemipterist* **1**: 38–103. [*https://sites.google.com/site/TheHemipterist*]

Ryan, R. P. 2014b. An Atlas of the Hemiptera-Heteroptera of the British Isles. [*https://sites.google.com/site/BritishHetBugAtlas*].

New county records for some species of Hemiptera-Heteroptera from North Wiltshire (VC7). – I recently reported in this journal a new vice-county record for *Psallus luridus* Reuter (Miridae) from Cobham Frith, near Marlborough, North Wiltshire (VC7) on 15th July 2012 (Ryan, 2013). Following the recent publication of the new county distribution of the Hemiptera-Heteroptera (Ryan, 2014), I have discovered that I also made two more new county records in this area, without knowing it.

A short distance from my capture of the above bug (SU258675), and probably within the same hour, I swept the Bramble Capsid, *Macrolophus rubi* Woodroffe (Miridae). During an earlier visit to the area, on 20th June 2012 in Savernake Forest, I found *Acalypta carinata* (Panzer) (Tingidae) by sampling moss along the edge of a ride (SU212673), using a Vax LiFE handheld vacuum cleaner (Ryan, 2012). Neither of these animals is listed by Ryan (2014) for Wiltshire, and they are therefore new to the county.

These records demonstrate the many gaps that exist in the new county distribution, many of which could be filled by entomologists checking their records, as I have done. – R. P. RYAN, 38 St John Street, Oxford, OX1 2LH (email: RobRyanBugs@gmail.com).

REFERENCES

Ryan, R. P. 2012. The use of a domestic vacuum cleaner as a suction sampler. *British Journal of Entomology and Natural History* **25**: 224–225.

Ryan, R. P. 2013. *Psallus luridus* Reuter (Hemiptera: Miridae) in North Wiltshire. *British Journal of Entomology and Natural History* **26**: 8.

Ryan, R. P. 2014. The county distribution of the Hemiptera-Heteroptera of the British Isles, fourth edition. *Hemipterist* **1**: 38–103. [https://sites.google.com/site/TheHemipterist]

A REMARKABLE SAPROXYLIC INSECT FAUNA FROM A TRADITIONAL ORCHARD IN WORCESTERSHIRE – BUT ARE THE SPECIES RESIDENT OR TRANSITORY?

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Abstract

Two flight interception traps were operated within a traditional orchard nature reserve across the 2013 field season. The resulting catch included four species with British Red Data Book status and 16 with Nationally Scarce status, with the emphasis very much on saproxylic species and especially those regarded as characteristic of ancient wood pasture situations. The same site has been surveyed on two occasions previously, although by direct investigation using standard collecting techniques. The three datasets show remarkably low levels of consistency, raising the question of whether, on the one hand, this is an extraordinarily rich site which has yet to come close to being fully documented or, alternatively, the site is subject to considerable interchange of species with the surrounding landscape. While a traditional orchard may provide habitat for typical wood pasture species, it cannot be considered ancient wood pasture habitat as its history as suitable habitat may be relatively short – an isolated traditional orchard such as this may therefore be acting as an important stepping stone habitat, offering scope for species operating meta-population dynamics.

Introduction

The insect fauna of traditional orchards has been subject to very little interest from entomologists historically. The development of the UK Biodiversity Action Plan process has however stimulated considerable survey work, initially by the addition of Noble Chafer *Gnorimus nobilis* (L.) to the list of Priority Species. The People's Trust for Endangered Species (PTES) quickly adopted Noble Chafer as a focus for research work and has been at the forefront of conservation action on traditional orchards ever since. Other key studies in Britain include English Nature's (now Natural England) biodiversity studies of six traditional orchards (Lush *et al.*, 2009) and the Wyre Forest Study Group's survey of three traditional orchards within the Wyre Forest SSSI (Smart & Winnall, 2006). Inventory studies such as these have inspired scientific studies in the Czech Republic (Horak *et al.*, 2013).

The PTES purchased a traditional orchard in Worcestershire in 2003 in order to conserve it as an example of a traditional orchard within the British range of Noble Chafer. The orchard has been subject to a series of specialist invertebrate surveys in order to maintain an overview of site quality and condition, and this article reports on the results of the latest survey, carried out over summer 2013, and discusses some of the implications.

The Study site

Rough Hill Orchard occupies a steep escarpment slope above a meander of the River Avon at Birlingham, Worcestershire (SO929442). The escarpment is cut by the

south-westerly-flowing river and deflects the river eastwards for a short section before it swings back around south of Birlingham. The orchard is therefore east-facing and sheltered from the prevailing south-westerly weather systems by the plateau behind on the west side and to the south. The orchard enclosure is about 10ha in extent.

At the time of acquisition the orchard contained about 82 veteran apple trees. These were concentrated in the southern half of the enclosure, the northern half being dominated by mature hawthorn trees. Many of the veteran apple trees had already collapsed and others have continued to do so. The total of standing trees is now probably closer to 30. The veteran apple trees have been individually tagged and GPS mapped. New plantings of both apple and plum have been carried out – there are a few veteran plum trees along the upper boundary fence, demonstrating previous use of the site as a plum orchard, at least in part. The orchard had formerly been managed by grazing but this had long since ceased and the herb-rich grasslands have suffered from very extensive bramble encroachment. A limited cattle grazing regime has recently been re-established as part of a programme of bramble control and restoration of the grassland.

The orchard lies in an area rich in saproxylic invertebrates. It is situated between the important sites of Bredon Hill (Whitehead, 1996) and Croome Park (Lott *et al.*, 1999), respectively at about 3km to the south-east and to north-west. The Worcestershire Wildlife Trust (WWT) reserve of Tiddesley Wood is closely adjacent to the north and includes a traditional plum orchard on its far, north side. The area historically held a large concentration of fruit orchards but most have subsequently been grubbed out.

Prior to purchase, the PTES commissioned J. & P. Whitehead, Landscape Consultants, to carry out a day's field survey to assess site quality for arboreal insects, with particular regard to the potential for Noble Chafer. None was detected but the orchard proved to be notably rich in other saproxylic insects (Whitehead, 2001). KNAA was subsequently commissioned to carry out baseline surveys of the saproxylic invertebrates in order to maintain knowledge of the fauna and the conservation management implications (Alexander, 2006 & 2013). The results of the 2013 survey are reported here and compared with those of the earlier surveys.

Survey techniques

The two previous surveys had been based on standard entomological hand survey techniques, i.e. searching the trees and associated decaying wood, supplemented by use of a beating tray and sweep net. With the continuing decline in the health and stability of the veteran apple trees, and – in particular - due to the volume and height of bramble scrub amongst the trees, it was decided to focus on trapping for the 2013 survey. Some supplementary hand survey was also carried out on the more accessible trees while on site.

Flight interception trapping is becoming a very popular way of extending the sampling periods so that sampling continues uninterrupted between each visit by the surveyor. It is especially valuable in wet climates such as ours as continuous trapping enables sampling to take place during any dry periods between the visits. Two flight interception traps were accordingly placed in the orchard on 30 May 2013, emptied and re-set 15 July, and finally emptied and removed 30 October. The aim of sampling was qualitative rather than quantitative.

The flight interception trap used in this study is based on a standardised construction (see Fig. 1). The basic collecting containers are four 2l plastic drinks

Fig 1. A small flight interception trap, of four bottle design, tied above a rot-hole on an old apple tree in Rough Hill Orchard.

bottles with large windows cut into their sides. The bases of the bottles are screwed into a square wooden base, and the four windows positioned facing outwards. The wooden base is then suspended – from the base of a branch or just tied around a tree trunk – using baler twine, with the bottles hanging upside-down beneath. The lower parts of the upside-down bottles are filled with a preservative solution (50% commercial antifreeze solution in tap-water, plus a little washing up liquid to reduce surface tension). The solution and catch are later drained through the neck of the bottle by removing the plastic cap and draining the contents into a collecting pot for sorting under a microscope later. The basic design is derived from a trap devised by Carrel (2002) for sampling field layer invertebrates.

A flight trap of this construction was chosen in preference to a Malaise trap as the latter trap design has a reputation for killing large volumes of flying insects which then become a logistical problem to sort and identify. The position of Malaise traps also has a major influence on catch size and composition. The bottle flight traps are multidirectional and so do not suffer from this complication; sample size is much

more manageable; they are also small and flexible for targeted positioning. No studies comparing the two types of traps have been carried out but it appears that Malaise traps may be better at intercepting large strongly-flying insects such as hoverflies.

The two selected trapping sites were as follows:

- Inside the hollow trunk cavity of a veteran apple tree, the trap suspended in the void above a large accumulation of wood mould;
- Below a medium-sized branch-scar rot-hole in the upper trunk of another veteran apple tree; although there was no sign of any bracket fungi at the time, fresh growth of Dryad's Saddle *Polyporus squamosus* Huds. ex Fr. had developed by the time of the July visit.

Results

Eighty-nine saproxylic (wood-decay) species of invertebrates were found during 2013. These include four British Red Data Book (RDB) species, all new to the site list: the False click beetle *Eucnemis capucina* Ahrens (Eucnemidae), the beetle *Scraptia testacea* Allen (Scraptiidae), the freeloader fly *Madiza britannica* Hennig (Milichiidae) and the crane fly *Rhipidia uniseriata* Schiner (Limoniidae). There were additionally nineteen species of Nationally Scarce (NS) status – not all saproxylic – as well as many local and generally uncommon species. The RDB and NS species are listed in Table 1 together with species of equivalent status found during the previous surveys.

Additionally a Nationally Scarce spider, *Nigma walckenaeri* (Roewer) (Dictynidae) was knocked from *Clematis* growth over scrub. This is best known in Britain around the lower Thames basin but there is also a small population known along the Severn/Avon valley; it has apparently been found much more widely in recent years and its status merits downgrading. The spider spins a small web and retreat on the upper surface of leaves of bushes growing in parks, gardens, and other suitable situations.

The species composition of the saproxylic Coleoptera and Diptera appears to be exceptional – even for a traditional orchard – but this partly reflects lack of understanding of the potential of such sites: the more research that goes into the saproxylic invertebrates of old orchards the more surprises emerge. It is becoming increasingly clear that our traditional orchard landscapes may be as important for saproxylic invertebrates as the historic parklands and wood pasture systems. The main differences appear to be that the latter may include larger trees, with larger volumes of heartwood decay and wood mould, but that traditional orchards tend to have higher densities of veteran and hollowing trees. It is generally assumed that larger volumes of decay and wood mould are required by some of our rarest and most threatened species, and so these species cannot live in traditional orchards because the trees have too small girths. Increasingly, however, the list of saproxylic species which have never been found in traditional orchards is being eroded away.

Key Beetle Species

The discovery in 2013 of the beetle *S. testacea* is an excellent example of an old growth species which might not be expected in a traditional orchard, as this species is best known from sites with concentrations of ancient oaks. This appears to be the first British record from a traditional orchard as well as from a hollow apple tree. However, the species has been reared out of old nest material from a hollow grey poplar (Mendel, 1989) and found in association with rotten alder wood (Collier,

Table 1 British Red Data Book and Nationally Scarce insects recorded in Rough Hill Orchard, with dates of capture (Falk, 1991; Hyman, 1992; Falk & Chandler, 2005; Falk & Crossley 2005).

Species	Status	2001	2006	2013
Coleoptera				
Plegaderus dissectus Erichson	Nationally Scarce	+		
Euplectus mutator Fauvel	Nationally Scarce			+
Gyrophaena joyi Wendeler	Nationally Scarce	+		
Gyrophaena manca Erichson	Nationally Scarce	+		
Quedius maurus (C. R. Sahlberg)	Nationally Scarce			+
Quedius truncicola Fairmaire & Laboulbène	Nationally Scarce			+
Eucnemis capucina Ahrens	RDB1 (Endangered)			+
Ampedus rufipennis (Stephens)	RDB2 (Vulnerable)	+		
Megatoma undata (L.)	Nationally Scarce			+
Hedobia imperialis (L.)	Nationally Scarce	+		
Hadrobregmus denticollis (Creutzer)	Nationally Scarce			+
Tillus elongatus (L.)	Nationally Scarce			+
Opilo mollis (L.)	Nationally Scarce		+	
Pseudotriphyllus suturalis (F.)	Nationally Scarce			+
Mycetophagus piceus (F.)	Nationally Scarce			+
Hallomenus binotatus (Quensel)	Nationally Scarce			+
Orchesia micans (Panzer)	Nationally Scarce		+	
Abdera flexuosa (Paykull)	Nationally Scarce	+		
Osphya bipunctata (F.)	RDB3 (Rare)		+	
Prionychus ater (F.)	Nationally Scarce	+		
Prionychus melanarius (Germar)	RDB2 (Vulnerable)		+	
Ishnomera sanguinicollis (F.)	Nationally Scarce			+
Scraptia testacea Allen	RDB3 (Rare)			+
Scolytus mali (Bechstein & Scharfenberg)	Nationally Scarce	+	+	+
Diptera				
Ctenophora pectinicornis (L.)	Nationally Scarce			+
Rhipidia uniseriata Schiner	RDB3 (Rare)			+
Exechiopsis membranacea (Lundström)	Nationally Scarce			+
Eupachygaster tarsalis (Zetterstedt)	Nationally Scarce			+
Tachypeza fuscipennis (Fallén)	Nationally Scarce			+
Lasiambia brevibucca (Duda)	Nationally Scarce			+
Madiza britannica Hennig	RDB2 (Vulnerable)			+

1994), and so it is known to be capable of breeding in smaller girth trunks. It is known from both Bredon Hill (Whitehead, 1996) and Croome Park (Lott *et al.*, 1999).

The click beetle *Ampedus rufipennis* (Stephens) might also be a great surprise to find breeding in a traditional apple orchard, although knowledge of its ecology is actually consistent with this situation. Whitehead (2005) published his discovery of larvae in a fallen apple tree in this orchard in 2001. While it has not been detected here subsequently it may still be present. Larvae and elytra of this species have also been found by KNAA in the WWT's traditional plum orchard at Tiddesley Wood Reserve in 2013, when surveying as part of a Field Studies Council course. The apple trees at Rough Hill Orchard are being hollowed by the bracket fungus *Inonotus hispidus* (Bull.) P. Karst., the typical heartwood-decay fungus of both apple and ash trees, while the Tiddesley plum trees are being white-rotted by *Phellinus pomaceus* (Pers.) Maire. At Bredon Hill, this click beetle is particularly associated with ash

pollards hollowed by *I. hispidus*. It appears to be associated with white-rotten heartwood, irrespective of the decay fungus involved. Smaller girth trees can clearly provide suitable habitat. This beetle is not known from nearby Croome Park.

The third beetle species which merits special mention is *E. capucina* as it currently has 'Endangered' status (Hyman, 1992). For many years this was only known from the New Forest, but was later discovered in Windsor Forest, and then on Bredon Hill (Whitehead, 1996). The New Forest and Windsor host trees were all beech, with the exception of a single report from ash at the latter site. At Bredon Hill it was found in a field maple, and it has subsequently been found at other sites in the Herefordshire and Worcestershire area, most recently from a cherry orchard (Alexander, 2010). Most reports which specify the details associate the species with rot-holes, and rot-holes may form on a wide variety of trees – both large girth and relatively small – in response to loss of lateral branches. It has not been found in Croome Park. A total of 18 beetles were taken by the rot-hole trap and just one from the hollow tree trap. Trapping is often said to be less damaging than hand-searching but clearly trapping has the capability of killing large numbers of emerging adults, and this should be a consideration when designing a survey programme.

Key Fly Species

The most notable dipteran found at Rough Hill Orchard is the freeloader fly *M. britannica*, another rot-hole species. The distribution and ecology of this species has recently been described elsewhere (Alexander & Perry, 2013), although Rough Hill Orchard provides the first records from: i) an apple tree as host, ii) a traditional orchard, and iii) the first record from Worcestershire. Rot-holes formed by *Polyporus squamosus* seem to be the most common factor in its presence at sites, and so its presence here is entirely consistent with its known ecology.

Amongst the nationally scarce fly species are three particularly interesting finds: *Eupachygaster tarsalis* (Zetterstedt) (Stratiomyiidae), *Lasiambia brevibucca* ((Duda) Chloropidae) and *Tachypeza fuscipennis* (Fallén) (Hybotidae). These records are discussed elsewhere (Alexander, in press).

Assessment of Site Quality

Two schemes have been developed for site assessment for nature conservation importance of saproxylic beetles: Site Quality Index (Fowles, Alexander & Key, 1999) and Index of Ecological Continuity (Fowles, Alexander & Key, 1999; Alexander, 2004). The SQI uses the national rarity statuses of the beetles to calculate an index. The IEC attempts to assess the old growth aspect of the site. Both have their own strengths and shortcomings and are best used alongside each other. A shortcoming of the SQI is that the index may increase or decrease with further recording and so, while it may provide a snapshot of site quality/condition at any point in time, it does not provide a reliable minimum assessment of the level of the value of a site in the way provided by the IEC.

The IEC is intended to provide a minimum assessment of the degree of ecological continuity on a particular site – the extent of continuity of old growth conditions over time. The index can only increase with further recording effort, it cannot decrease. The number of qualifying species known from Rough Hill Orchard has now increased to 19 and these generate an IEC of 33. The threshold for assessing national significance is 25 and the current figure of 33 therefore suggests the reserve now achieves national conservation importance for saproxylic beetles. It is the first individual orchard to do so. Attingham Park in Shropshire was designated as an

Table 2 Site Quality Index calculations for Rough Hill Orchard

Year of survey	2001	2006	2013
Site Quality Score	112	100	201
Number of qualifying species	28	23	44
Site Quality Index	400	435	457

SSSI primarily for its saproxylic beetle fauna which also had an IEC of 33 at the time.

A particular feature of the SQI is that it enables comparisons between datasets for a particular site and so can be used as part of long-term monitoring of site condition – an SQI approach underlies Natural England's invertebrate site condition monitoring for SSSIs. Rough Hill Orchard has now been surveyed on three separate occasions and the three datasets are analysed and compared in Table 2. It should be noted however that Fowles, Alexander & Key (1999) suggest that assessment may be unreliable below a threshold of 40 qualifying species and that the two previous surveys are below this threshold.

Interestingly, the three data sets show a gradual increase in SQI between surveys. This most probably reflects the site coming under conservation management, with all dead and decaying wood now being left in situ.

Fowles, Alexander & Key (1999) suggest a threshold of 500 for national importance, and so Rough Hill Orchard falls not far short of this level. That threshold is however believed by the present authors to be set far too high, and examination of the site data in Fowles, Alexander & Key (1999) suggests that Rough Hill's SQI of 457 is comparable with some of the richest sites in Britain for saproxylic beetles.

The conclusions from this analysis are that ecological continuity at Rough Hill Orchard is relatively high and of national significance, and that site condition for saproxylic beetles appears to be increasing. Unfortunately no system has been developed for similar analyses of saproxylic Diptera assemblages.

Are the species resident or transitory?

The three datasets however show remarkably low levels of consistency. Of the 31 species listed in the table, just one has been found during each survey episode, *Scolytus mali* (Bechstein & Scharfenberg). No other species has been detected more than once; the rest have been detected just once from the three surveys. No individual survey can be considered to have been exhaustive and so some variation would be expected, but the level of consistency does seem remarkably low. One option might be that this is an extraordinarily rich site which has yet to come close to being fully documented, that subsequent surveys will continue to detect additional species while the consistency level will gradually increase as the results tend towards completeness. Alternatively – and perhaps more likely for such a small site within a landscape relatively rich in veteran trees – the site may be acting as a stepping stone for species moving around this rich landscape; it may be part of a complex meta-population structure, with species continually colonising from neighbouring areas while others die out at the site level. Of course, both explanations may be partially correct.

Two of the beetle species recorded in 2013 suggest that some species at least are passing through. Single specimens of *Mycetophagus piceus* (F.) and *Cis fagi* Waltl

were taken in the rot-hole flight trap. Both are believed to exclusively develop in the mycelial sheets of *Laetiporus sulphureus* (Bull.) ex Fr.) Murr. deep within the red-rotting heartwood of trees. Neither the fungus nor red-rot have been seen in the veteran apple trees present in this particular orchard, although apple trees are occasionally colonised by this fungus. Adults of *M. piceus* are known to be attracted to the brackets of other fungi species, presumably feeding on the spores, and the fruiting of *Polyporus squamosus* may explain the presence of this species here.

The fauna found in Rough Hill Orchard bears closest resemblance to that of Bredon Hill (see Whitehead, 1996), although about 3km distant. Could there be interchange of species between these two sites? The prevailing winds are south-westerly of course, but southerly and south-easterly winds might aid dispersal from Bredon Hill to Rough Hill on occasion. The rarest beetle species so far known from Rough Hill Orchard, the False click beetle *E. capucina*, is known from a number of sites across the Worcestershire and Herefordshire area, and meta-population dynamics may help to explain its presence in relatively small concentrations of suitable veteran trees. The sites may be acting as short-term holding areas for breeding populations, but this would require greater mobility than currently credited for the species.

Conclusions

The survey has demonstrated that Rough Hill Orchard continues to support a relatively high quality saproxylic invertebrate fauna. Analysis of the species data demonstrates that ecological continuity of old growth habitat at Rough Hill Orchard is relatively high and of national significance, and that site condition for saproxylic beetles appears to be increasing.

This single orchard has now produced records for five Coleoptera and two Diptera which currently have RDB status in Britain, and 19 and 5 respectively with Nationally Scarce status. This is a remarkable assemblage for a group of so few veteran apple trees.

What is clear is that Rough Hill Orchard and the landscape in which it sits has the potential to form a very interesting research site for the investigation of the population dynamics of some of our rarest saproxylic insects, and especially research of their dynamics at landscape scale.

Acknowledgements

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References

Alexander, K. N. A. 2004. Revision of the Index of Ecological Continuity as used for saproxylic beetles. *English Nature Research Report* No. **574**.

Alexander, K. N. A. 2006. *Rough Hill Orchard, Birlingham, Worcestershire. Baseline Survey of Saproxylic Invertebrates*. Unpublished contract report to People's Trust for Endangered Species.

Alexander, K. N. A. 2010. A remarkable wood-decay beetle fauna from a group of traditional orchards at Colwall, Herefordshire. *The Coleopterist* **19**: 11–14.

Alexander, K. N. A. 2013. *Rough Hill Orchard, Birlingham, Worcestershire. Baseline Survey of Saproxylic Invertebrates*. Unpublished contract report to People's Trust for Endangered Species.

Alexander, K. N. A. in press. A remarkable Diptera fauna found by flight trapping in a Worcestershire traditional apple orchard. *Dipterists Digest*.

Alexander, K. N. A. & Perry, I. 2013. The distribution and ecology of the freeloader fly *Madiza britannica* Hennig (Diptera, Milichiidae). *Dipterists Digest* **20**: 202–204.

Carrel, J. E. 2002. A novel aerial-interception trap for arthropod sampling. *Florida Entomologist* **85**: 656–657.

Collier, M. 1994. Some notable Norfolk Coleoptera, including four new county records. *British Journal of Entomology & Natural History* **7**: 168.

Falk, S. J. 1991. A review of the scarce and threatened flies of Great Britain (Part 1). No. 39. Nature Conservancy Council.

Falk, S. J. & Chandler, P. J. 2005. A review of the scarce and threatened flies of Great Britain. Part 3: Empidoidea. Species Status No. **3**. Peterborough: Joint Nature Conservation Committee.

Falk, S. J. & Crossley, R. 2005. A review of the scarce and threatened flies of Great Britain. Part 2: Nematocera and Aschiza. Species Status No. **2**. Peterborough: Joint Nature Conservation Committee.

Fowles, A. P., Alexander, K. N. A. & Key, R. S. 1999. The Saproxylic Quality Index: evaluating wooded habitats for the conservation of dead-wood Coleoptera. *The Coleopterist* **8**: 121–141.

Horak, J., Peltanova, A., Podavkova, A., Safarova, L., Bogusch, P., Romportl, D. & Zasadil, P. 2013. Biodiversity responses to land use in traditional fruit orchards of a rural agricultural landscape. *Agriculture, Ecosystems & Environment* **178**: 71–77.

Hyman, P. S. (revised Parsons, M. S.). 1992. A review of the scarce and threatened Coleoptera of Great Britain. Part 1. *UK Nature Conservation* **No 3.** Peterborough: Joint Nature Conservation Committee.

Lott, D. A., Alexander, K. N. A., Drane, A. B. & Foster, A. P. 1999. The dead-wood beetles of Croome Park, Worcestershire. *The Coleopterist* **8**: 79–87.

Lush, M., Robertson, H. J., Alexander, K. N. A., Giavarini, V., Hewins, E., Mellings, J., Stevenson, C. R., Storey, M. & Whitehead, P. F. 2009. Biodiversity studies of six traditional orchards in England. *Natural England Research Report* **NERR025**.

Mendel, H. 1989. *Transactions of the Suffolk Natural History Society* **25**: 26.

Smart, M. J. & Winnall, R. A. (eds.) 2006. The biodiversity of three traditional orchards within the Wyre Forest SSSI in Worcestershire: a survey by the Wyre Forest Study Group. *English Nature Research Report* No. **707**.

Whitehead, P.F. 1996. The notable arboreal Coleoptera of Bredon Hill, Worcestershire, England. *The Coleopterist* **5**: 45-53.

Whitehead, J. & P., 2001. *Rough Hill Orchard, Birlingham, Worcestershire, VC37, SO929442. Synopsis of bio-assessment undertaken on 14.6.2001.* Unpublished contract report to People's Trust for Endangered Species.

Whitehead, P. F. 2005. Notable Coleoptera records 5. *Entomologist's Gazette* **56**: 251–260.

BOOK REVIEW

Fossil Insects: An Introduction to Palaeoentomology by D. Penney and J. E. Jepson with artwork by Richard Bizley. Siri Scientific Press, 2014. Soft-back. 224 pp. 240 illustrations, mostly colour photographs. £24.99. ISBN 978-0-9574530-6-7.

Insects would appear to be among the earliest of land animals on this planet. Insects have been with us for at least 400 million years (MY), and, if winged for this period of time as the fossil record implies, probably arose in the late Silurian approximately 420 MY ago. They pre-date those fossil mega-stars, the dinosaurs, that so readily capture our imaginations, by many many million of years. The story of insects, those little creatures that intrigue us so much, is surprisingly far less well known or studied by comparison. The authors, David Penney of the University of Manchester and James Jepson of the Museum für Naturkunde in Berlin have produced an easy to read account of fossil insects to set the record straight. Palaeoentomology in the book title represents the interface between the study of two major scientific disciplines: palaeontology – the study of fossils, and entomology: the study of insects – an ideal place to study evolution on a grand scale with millions of species to compare and contrast.

The main sections describe what fossil insects are and how they are preserved, with examples from rock, amber, copal (plant resin at an intermediate stage of polymerisation and hardening between gummier resins and amber) and other postglacial deposits. The various techniques used to study fossils are described and if you should prove to be successful, how to describe a species new to science. This can be a bit more tricky than you might expect as one has to be aware of extinct orders of insects with unique combinations of morphological characters not seen in our present fauna (simply to know what type of insect it is to at least family level) and have a good grounding on where to access fossil collections or illustrations for comparison. This is one of the many strengths of the book as it contains a wealth of close-up photographs of important fossil insect taxa from around the world. It is well to remember the Chinese proverb 'The first part of knowledge is getting the names right'.

There is an important section on where to search for fossil insects and intriguingly there are several sites here in the UK where you can begin your investigations providing you have the necessary permission. Not so long ago I well remember Ed Jarzembowksi of Maidstone Museum showing me some perfectly formed '*Psylla*' wings preserved like miniature trilobites that he had found in a nearby quarry. They were so realistic I almost reached for my RES Handbook on Psylloidea.

The authors' aims, amongst others, have been to encourage amateurs and future researchers alike to enter the fascinating realm of palaeoentomology and in this they have succeeded remarkably well. This book is a welcome replacement for a Russian-authored volume, literally the only book on the subject available to us undergraduates many years ago. The Society would certainly benefit from a field meeting or two looking for fossil insects, though recording species as just 'pre-1800' in our data bases for the NBN Gateway might prove a little misleading.

JOHN BADMIN.

THE 2012 PRESIDENTIAL ADDRESS – PART 2
AN INTRODUCTION TO LEPIDOPTERA IN ARCTIC LAPLAND

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Lapland is an ill-defined area in the north of Norway, Sweden, Finland and Western Russia which is the traditional home of the Saami people and the grazing land of their reindeer. In Sweden it extends quite a distance south of the Arctic Circle but here I am confining my comments to the north of that line and excluding Russia which I have not visited. The line of latitude currently defining the Arctic Circle is 66.33°N and the provinces included therein are, in Sweden, Torne Lappmark and the northern parts of Lule Lappmark and Norrbotten; in Norway, Norlige Norrdland, Troms and Finnmark; and in Finland, Kemin Lappi, Enontekion Lappi and Inarin Lappi.

The central part of this area is predominantly flat boggy land a few hundred metres above sea level. On the west coast of Norway is a ridge of mountains which reaches inland to northern Sweden at Abisko and extends to the Arctic Ocean in the north, where at North Cape it ends in spectacular 400 metre cliffs. The highest mountain north of the Arctic Circle is only 1,907 metres high and in northern Sweden they are less impressive still, but the latitude means that conditions not found below 3,000 metres in the Alps are the norm here, and persist to sea level in the extreme north.

The "idea of North" as Philip Pulman (1995) has it, exerts a strong pull on certain people and I was hooked when I first read of earlier entomological visits there, initially in Barry Goater's article in the Entomologist's Record (1998) and subsequently in accounts by other, earlier, collectors. The tremendously evocative description in Henriksen and Kreutzer's "The butterflies of Scandinavia in nature" of H. Ramspring's discovery of the butterfly *Erebia polaris* Staudinger on the edge of Porsanger Fjord certainly had an effect on an old romantic like me.

W. G. Sheldon, writing in The Entomologist for 1912 describes the allure thus, "Of course there are many reasons why an expedition to Arctic Norway . . . is one that has charms, apart from the Lepidoptera. The wonderful experience, the view continually changing the whole time; the beauty of the scenery, the great wealth of life continuously around one – the bracing air, the perpetual daylight, and the charming Norwegian people, so honest, kindly, and obliging; all tend to impel one who has once been there to pay another visit."

In the more prosaic language of the twenty-first century it is an area which approaches on wilderness status, there is a very low human population, an abundant and beautiful flora and much that is unique amongst the Lepidoptera and other orders of insects. One is free to travel and roam with the minimum of hindrance and pursue insects in the same way. I have so far made three trips to this area, in 2004, 2008 and 2010. On each occasion I was accompanied by Alec Harmer, and we certainly intend to return (Plates 13–16).

A considerable entomological literature exists and is readily available, as is much information from internet sites. Since Carl Linnaeus made his botanical survey in 1732 many entomologists, mostly but not all Swedes have visited Lapland and their names live on in the species they described (Smith, 1811; Blunt, 1971). Not very many UK entomologists have ventured there and they seem to have been largely lepidopterists. H. Rowland-Browne, Dr T. A. Chapman and W. G. Sheldon all

collected butterflies here around the turn of the nineteenth century, and Barry Goater visited in the 1990s (Sheldon, 1911, 1912; Goater, 1998). These days several butterfly enthusiasts make the journey, but judging from the literature, not many with a primary interest in moths go that far north (Pickles, 2005), although Professor Ian Hodgkinson of Liverpool John Moores University is carrying out academic studies there in relation to climate change (e.g. Hodgkinson & Bird, 1998).

The prime dates for a visit with the intention of seeing as many macrolepidoptera species as possible are usually from the last week in June to the middle of July. Having said this, emergence times are strictly weather dependent and can vary enormously. At this time of year there is continuous daylight and temperatures can be surprisingly high. I have found little trouble adapting to the lack of darkness; it is invigorating, need for sleep seems to diminish enabling long days in the field.

The use of light to attract moths is useless and they have to be caught with a net like butterflies or found at rest by searching. Pheromones may be available for clearwing moths and some of the 'Plusia' moths within the Noctuidae. I have tried wine baits on numerous occasions with limited success but I have found moths attracted to flowers during both day and night. Labrador-tea, *Ledum palustre* (L.), and on the hills, moss campion, *Silene acaulis* (L.) seem particularly favoured.

In spite of 24 hour light, butterflies and moths still retain their set flight periods within the day. Butterflies generally fly from 08.00h to 16.00h local time and moths may be diurnal, crepuscular or nocturnal as elsewhere. As an example the noctuid moth *Lasionycta skraelingia* (Herrich-Schäffer) usually flies only for a defined four hour period between 22.00h and 02.00h although little change in light intensity can be discerned from the periods before and after this.

A fascinating feature is that the usually hidden night time activities of noctuid moths are revealed. We are accustomed to seeing these only at artificial light sources or baits, but here we can watch them seeking mates, laying eggs and visiting flowers in the same way that we can watch butterflies further south.

A number of different habitat types will be encountered. Pine forest covers much of central Sweden and extends just north of the Arctic Circle. By this latitude it is largely represented by sparse spruce forest featuring "bottle-brush Spruce" which is rarely more than ten metres high and has short branches to prevent their breaking under the weight of snow. This is probably a form of Norway Spruce, *Picea abies* (L.) Karsten although there seems to be controversy regarding its relationship to the Siberian Spruce, *Picea obovata* (Ledeb.). The trees grow extremely slowly because of the temperatures and some trees of these dimensions are reputedly five hundred years old. Moorland, either wet bog as in the neighbourhood of Kiruna, or *Dryas* heath abound. Both habitats are rich with many plants. *Betula pubescens* Ehrl. and *Salix* perhaps predominate in the wet areas and the heath land is predominantly made up of mountain avens *Dryas octopetala* L. which replaces *Erica* and *Calluna*. Further north into Norway and Finland a belt of Taiga birch extends from East to West. This is extremely dense and forms the tree line at a latitude where conifers do not occur except in isolated pockets. By the time one has reached the north coast, the treeline has descended to about 250 metres.

Rivers are either mountain torrents or sometimes, such as the Anarjohka between Finland and Norway, slowly meandering. The river banks can be interesting and we found large sandbars on the Anarjohka covered in a profusion of wild flowers. The bright yellow butterfly *Colias hecla* Lefèbvre and diurnal noctuid moth *Syngrapha hochenwarthii* (Hockenwarth) were abundant here amongst many other species, flitting from flower to flower in the company of scores of the pretty blue, *Plebejus idas* (L.). It was on the banks of the Elv at Laxselv on the Porsanger Fjord that

Sheldon encountered *C. hecla* for the first time. We did not see the *Colias* there but we did see the fritillary *Euphodryas iduna* (Dalman) in plenty and also the Polar Midnight Sun Rock Festival; two pleasures denied Sheldon.

Mountains are home to many of the special species in the area. The mountains to the south of Lake Tornetrask at the village of Abisko are very rich. The iconic Lapporten glacial valley leads into an area of wilderness where one can follow trekking routes such as the "Kungladen" for hundreds of kilometres through pristine country which is still home to Brown Bears, Wolverines and Lynx and more to the point, to a range of Lepidoptera.

Abisko and its neighbour Bjorkliden are now primarily tourist villages offering hotel and camping accommodation from which many visitors explore the surrounding hills in summer or take part in winter sports or view the Aurora borealis later in the year. Some of the area closest to Abisko, especially that part which can be easily accessed by ski lift, is part of the Abisko National Park. The National Park and nature reserve were set up as long ago as 1909 in response to over collecting of alpine plants for commercial purposes. For those wishing to use the ski lift rather than to walk up the steep hill it is a short walk out of this reserve, which is clearly indicated. Please do not be tempted to start turning over stones within the reserve.

From this viewpoint Lake Tornetrask is spread out below with the mountain barrier along its northern shores leading into Norway. The lake is some 60 kilometres long and eight wide and the mountains to the north are even richer than those to the south because they receive more of the available sunshine. Getting to them is a difficult matter. There is only a road on the southern side of the lake. It is possible with hard trekking and some river wading to walk round the western end of the lake and then to climb the mountains. When restricted by the limited time usually allowed by holidays, the several days necessary would make this difficult. Some Swedish entomologists take a canoe or small boat and sail across, but the lake is often tossed by heavy winds and only experienced boatmen should attempt this. Once a week a commercial boat crosses the lake but only allows a short time to explore. One is left with no alternative but to take a helicopter! If it is possible to share, the cost becomes not unreasonable and the climbing is eliminated (Fig. 1). It would be possible to take a tent and stay for several days as fishermen after Arctic Char often do. On our second visit to Abisko we hired a helicopter and had a wonderful day on the mountains but on our next visit the weather was too bad to commit to the trip. Whenever one ventures into the field in search of insects weather is a factor of course, but up here one expects to lose a high proportion of time.

By the time one reaches the Arctic shoreline mountain conditions prevail at sea level and the weather is subject to very rapid change. There is only sparse vegetation over the rocks. It was strange to see the geometrid moth *Glacies coracina* (Esper), our Black Mountain Moth, abundantly flying over the beach when in the past I had spent many hours high in the Cairngorms searching for it. On our first visit to Porsanger a beautiful sunny evening was replaced in a couple of hours by a northerly storm which kept us hunkered down in our camper van for four days.

One last habitat type which should be mentioned is man-made habitats such as roadside verges. Ditches and banks bordering the roads are often rich with flowers and accompanying insects. *Erebia polaris* Staudinger was only encountered by us in such conditions as were several of the *Plusia* species. *Pieris napi adalwinda* Fruhstorfer, the Green-veined White in its darkly suffused form is most common by the roadside, and one of the best habitats for the fritillaries *Boloria aquilonaris* (Stichel) and *B. napaea* (Hoffmannsegg) we encountered was on the Bjorkliden golf

Fig. 1. Our helicopter taxi arrives.

course; one of the most northerly in the world and famous for inviting golfers to play a round at midnight.

It is undoubtedly a good idea to break new ground when searching for insects and extend knowledge of distribution. However, when first visiting an area as vast and different as this, especially when having limited time, it is perhaps wise to learn something of terrain, habits and techniques on a first visit by seeking out some of the classic localities.

Jukkasjarvi is a village close to Kiruna in Sweden which is now famous for its Ice Hotel. In the woods a few kilometres away along the track which leads to the European Space Agency's Esrange Space Centre satellite tracking station, is an open patch, ideal for parking and camping. Along tracks leading through bottlebrush spruce down towards a lake is the classic locality pictured in Peder Skou's (1991) "Nordens Ugler", home to five restricted species of the noctuid genus *Xestia* as well as *Lasionycta skraelingia* and *L. secedens* (Walker) and the lasiocampid *Cosmotriche lobulina* (D. & S.). Most of these species need to be caught with a long handled net as they fly between the spruce trees. By day several species of fritillary are common, as are blues and Erebias. The rare noctuid *Polia lamuta* (Herz) was found here, most commonly by searching trunks at around 16.00h in the afternoon, but it has not been seen for several years. When describing how to find this moth Barry Goater told me to move quickly from tree to tree as they were there for a limited time only. "Run, run, run!" he said.

If one drives from Kiruna, the principal and most northerly mining town in Sweden, across Finland towards Alta on the north coast of Norway one enters the spectacular Alta Canyon and comes via the little village of Gargia to the mountain of Gronnasen. We would perhaps think of this as a hill if it were in the South as it is only some 500m high, but it is alpine in flora and has the advantage of being just accessible to vehicles. On our first visit it was necessary for one of us to jump out and

push the van to get it over the steepest parts of the track. We have encountered bad weather here, cold, rain and fog as well as high winds. At the foot of the mountain a plaque commemorates a circuit judge and his two servants caught in a blizzard in July in the late nineteenth century. The judge survived, but his companions perished; perhaps a comment on the judiciary as much as the weather. It is perhaps appropriate to mention the dangers of working on the mountains especially in such remote areas. It is essential to have proper clothing and equipment and to take all possible precautions. It is remarkably easy to lose oneself and one's companions. We always carry two-way radios to keep in touch. (These are also useful for crowing over new captures!)

However, in the short spells of good weather we have encountered on Gronnasen we have seen many exciting species. Amongst the butterflies, *Clossiana polaris* (Boisduval), *Clossiana chariclea* (Schneider), and *Oenides bore* (Schneider) and amongst the moths *Lasionycta staudingeri* (Aurivillius) *and Xestia quieta* (Hübner) as well as the rare geometrid, *Psychophora sabinii* Kirby. A pale form of *Colias hecla* has occasionally been recorded here, and this is a suspected hybrid with *C. tyche* (Bober). It is known as form *christiernssoni* Lampa.

For those who don't want to risk the weather in Norway a long trek into the mountains south of Abisko will lead at around 1,100 metres to a similar area. In addition to most of the species mentioned above three tiger moths not often encountered elsewhere may be found. These are discussed further on.

Returning to Norway, the extreme north near Porsanger Fjord is the home of many mountain species which here descend to sea level. *Erebia polaris* and *Euphodryas iduna* (Dalman) are found here as is the noctuid *Polia richardsoni* Curtis and several others.

It is not difficult to get to Lapland. There are regular flights to Kiruna and towns in Arctic Finland and car hire is available. However this could be expensive and accommodation is limited to the tourist villages. We have always travelled by camper-van which enables us to take equipment and avoids accommodation costs and many food costs. The cost of living is very high in Scandinavia so this is quite a consideration. It is 3,000 kilometres from the south of England to the Arctic Circle in Sweden, so with running about from locality to locality trying to get the timing right, a three week trip might involve 10,000 kilometres of travel, some, but not much of which, would be by ferry. Ferries are currently not available to Norway so the routes are either Harwich to Esbjerg in Denmark and drive via Malmo in Sweden or alternatively Dover to Calais, and then through Belgium and Germany to Rostock, a ferry to Denmark is available here and then journey by the same road. At the time of writing the ferry to Esbjerg is apparently suspended. In either case, with two drivers, it will take about three days to reach the Arctic Circle. The roads are slow and heavily restricted in Norway but good and straight for the most part in Sweden until the extreme north. Elk are common from the south of Sweden and are notorious for running onto the road at dusk and dawn. Unless driving a Saab, which reputably have Elk-proof windscreen pillars, it is unlikely that a collision with one can be survived. In the north facilities are scarce and it is wise to carry emergency equipment, in particular against bad weather or accident in the mountains.

In the forests and moorland mosquitoes can be a vexation (Fig. 2). But the phrase to remember is "no mosquitoes, no moths". I have found deet products effective, especially when sprayed on the rim of a wide hat; but some people wear beekeeper's nets. It is also wise to read the health warnings associated with anti-mosquito products. In the mountains mosquitoes are less of a nuisance but are replaced by other biting flies.

Fig. 2. The author identifying specimens in mosquito-free luxury.

In the appendices I list notable species from the area, but I will mention in some detail a few of the Lepidoptera that make this area so interesting. Three species of *Colias*, Clouded Yellows, are found of which *tyche* and *hecla* are essentially confined to the Arctic. *Colias tyche werdandi* Zetterstedt was thought for a long time to be a form of *C. nastes* Boisduval but this taxon is probably restricted to the American arctic, although there are specimens identified as *C. nastes* from Nova Semlja which require confirmation (Tshikolovets, 2011). We have encountered this butterfly flying actively in sunshine near Abisko and Bjorkliden. It is a common butterfly here and can also be found at rest in the sparse grass in overcast weather. It rests close to the ground angled to one side and does not move even when approached with a camera to within a few centimetres. Alec Harmer has reared this species *ex ovis* to adult and also *hecla* as far as hibernation. It flies up to 1,100 metres above sea level and apparently appears from mid-May in seasons when the snow melts early. *Colias hecla* flies later, on average from the first week of July, and is found in mountains in Sweden and further north down to sea level. We have seen it high on the mountains to the north of Tornetrask, on Gronnasen as well as on River Anarjohka as described above. It rests angling its wings in the same way as *werdandi*. It appears in the European arctic as subspecies *sulitelma* Aurivillius. Both of these species feed as larvae principally on *Astragalus*. The third species, *C. palaeno* (L.) appears sparingly over the whole area, preferring wet habitats.

The fritillary *Euphydryas iduna* is a difficult species to see as it has an extremely short flight period, maybe as short as five days. It is found at Abisko but we failed to find it on our first visit. On our second trip north we were told the flight period was over in north Sweden so we drove to the north Norway coast where we thought it might emerge later. After a day searching we found a few very fresh specimens just as they were going down at the end of the afternoon on the eastern shore of Porsanger

PLATE 13. Fig. 1. Alec Harmer on the summit of Gronnasen with minimal vegetation. The long net enables an approach to be made to insects visiting *Silene* mats. Fig. 2. Tony Pickles at Jukkasjarvi showing bottle brush spruce with a rich understory of dwarf birch and some Labrador-tea. Note the long net and deet-soaked wide brimmed hat.

PLATE 14. Fig. 1. *Symplistis heliophila* high above lake Tornetrask. These moths settle briefly and then fly in a rapid zig-zag at just above the vegetation. Fig. 2. *Colias hecla* showing its angled resting position. Fig. 3. The geometrid *Rheumaptera subhastata* flies together with *R. hastata* in birch woods between Kiruna and Abisko. Fig. 4. Larvae of *Epirrata autumnata* drowned in a flooded footprint beneath defoliated birch.

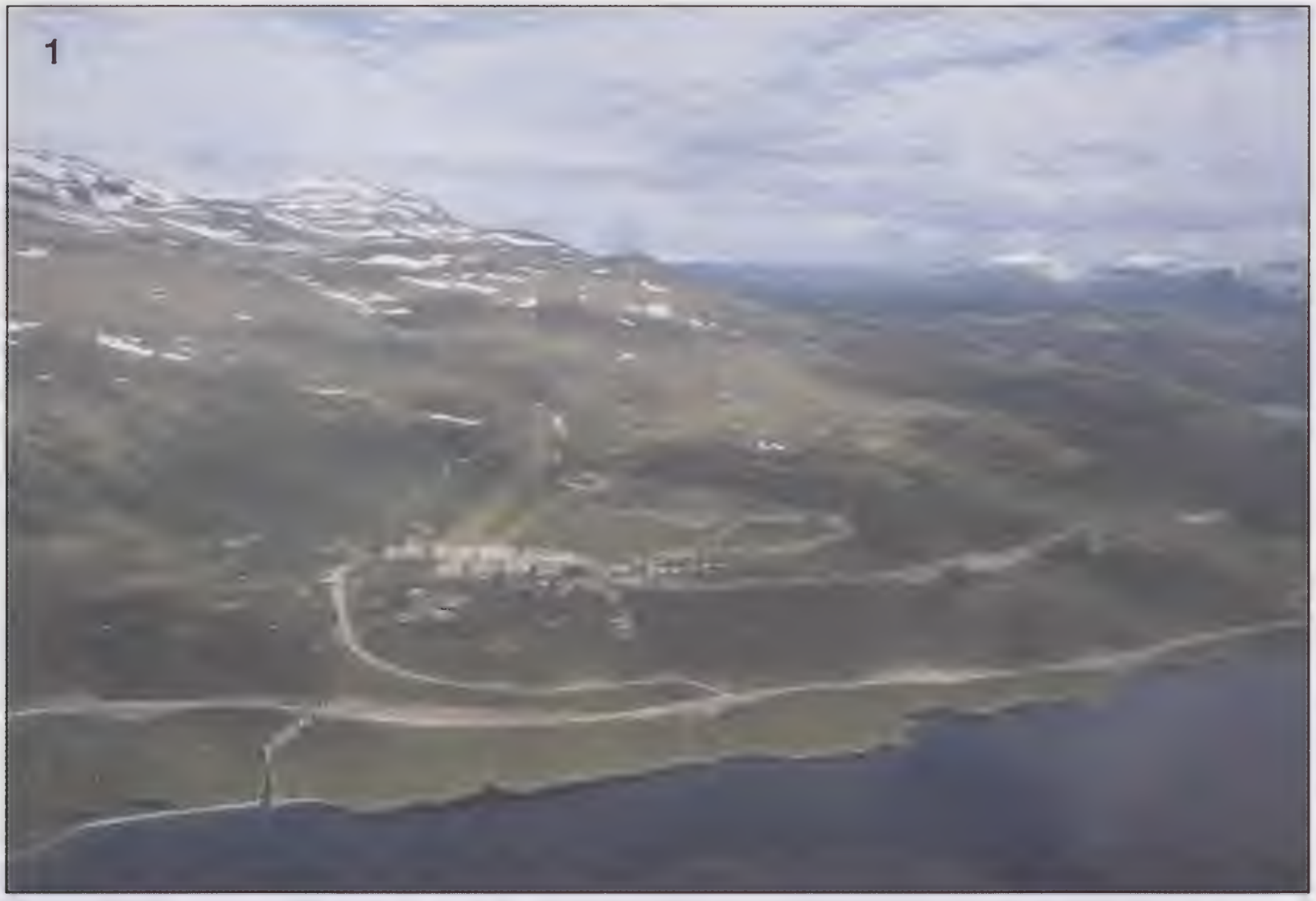


PLATE 15. Fig.1. View of the village of Bjorkliden, the hotel complex and golf course from our helicopter. Just below the small lake above the golf course is the *Dryas* heath. The road and railway to Narvik are in the foreground. Fig. 2. Mountain locality north of Lake Tornetrask, the view from Sweden looking into Norway. The fritillary *Clossiana improba* was found here in some numbers together with other species mentioned in the text.

PLATE 16. Lakselv and Porsanger Fjord. Fig. 1. Sheldon's locality at Lakselv on the north coast of Norway. It was here that he encountered *Colias hecla* for the first time in 1912. Fig. 2. Looking from our locality for *Euphydryas iduna* along Porsanger Fjord where sparse alpine vegetation comes down to the sea.

Fjord. After being virtually confined to our vehicle by bad weather for four days we could only find very worn examples which lead us to suspect that when they could not fly they probably crawled through the undergrowth to get on with their life.

Clossiana euphrosyne (L.) the Pearl Bordered Fritillary, has a very wide distribution and was common not so long ago in oak woods in southern England; in Lapland there is a dusky form which spreads north from the Arctic Circle and flies over bogs and wet moorland most commonly. This is known as form *lapponica* and is smaller as well as significantly darker than specimens from England. From the north of Sweden there is a very small form which has been known as *septentrionalis* this has now been synonomised by Vadim Tshikolovets along with over 60 other named forms and subspecies (Tshikolovets, 2011). Amongst the many other fritillaries are the beautiful *Clossiana frigga* (Thunberg) found in bogs and *C. freija* (Thunberg) which is found both in bogs and on mountains, but which always appears "washed out" even when immaculately fresh.

Three species of fritillary which are confined to latitudes above 68°N and also to mountains are *Clossiana improba improbula* Bryk, *C. polaris* (Boisduval) and *C. chariclea* (Schneider). *Clossiana i. improbula* has a very restricted area around the west of lake Tornetrask where it appears up to 1,200 metres above sea level on glacial plateaus. It is most often seen where there is shelter from the west wind and low *Salix* growth. In these desolate and windswept areas this is not a common situation and the butterfly is seldom recorded. It flies rapidly a few centimetres above the ground amongst alpine bistort *Polygonum vivipara* (L.) and a dwarf creeping sallow, *Salix herbacea* (L.). The adult butterflies probably spend much of their lives crawling rather than flying. When we first encountered it we were unsure if we were in Sweden or Norway where it had apparently not been recorded for some years. It was clearly not respecting international boundaries, however. The species is circumpolar with the type coming from the Canadian arctic. *Clossiana polaris* is seen sparingly at altitude to the north of Tornetrask and at Gronnasen. In three trips north, Alec Harmer and I have seen only one each. *Clossiana chariclea* also has a circumpolar distribution. We have only seen it on Gronnasen. We think it tends to fly a little later than the other species discussed and that this is why we have seen so few of this quite widely distributed species.

There are many interesting geometers but I will just comment on *Epirrita autumnata* (Borkhausen) which, being such a common British moth may be thought in many ways the least interesting. Only *autumnata* of this difficult genus occurs in Lapland (Skou, 1984) so there is no problem in identifying the moth. It is however responsible for defoliation of vast areas of birch in certain years, several hundred square kilometres on occasion and, as the birch very often does not survive, this in turn can lead to substantial changes in the ecology of whole areas. We have seen the ground beneath denuded trees blanketed with countless larvae, a glut for nesting fieldfares and bramblings but devastating for the area.

Turning to Noctuoidea there are five interesting tiger moths in Arctic Lapland (Witt & Ronkay, 2011) of which *Borearctia menetriesi* (Eversmann) is the most enigmatic, being only known from one or two specimens from Northern Finland. (De Freina & Witt, 1987–2001; Murzin, 2003; Bolotov *et al.*, 2013) There is some chance of finding the other four species. In the higher mountains near Abisko are three species of which *Grammia quenseli* (Paykull) is the commonest. This moth is also known from the Alps. Towards the end of June in even years is the right time to seek cocoons under stones at around 1,000 metres. In much more restricted areas on mountains five to ten kilometres south, pupae of *Acerbia alpina* (Quensel) may be found. This is a circumpolar species with polyphagous larvae. The males, as with all

these arctic arctiids are active in the day. The third species in the mountains is *Holoarctia puengeleri fridolini* (Torstenius). This was first taken by Stig Torstenius in the same area as *A. alpina* on the mountain Nissontjarro (S. Torstenius, pers. comm.). A few specimens have also been taken on the mountains bordering the Norwegian coast just south of Laxselv. These were initially reported as the nominate subspecies but it is now considered that all European and Ural populations are subspecies *fridolini*. Because these moths all fly by day it is quite possible that they could be seen in flight or found at rest but an active strategy which is perhaps more likely to succeed is to systematically search under rocks for the cocoons.

Arctia (*Arctia*) *lapponica* (Thunberg) is a species of the wetter moorland at lower elevations such as the bogs at Krokvik between Kiruna and Abisko, which are some 450m above sea level. Here the moth flies in afternoon sun and rests in dwarf birch trees or on the ground rather like *Endromis versicolora* (L.), the Kentish Glory, does in Scotland. On our visits to this locality, afternoon sun has been in short supply and we have not seen it flying although it is reported as resembling a large fritillary (B. Goater, pers. comm.). On our last visit we were shown an example that had just been found resting just above the ground on a small birch.

Within the Noctuidae there are four interesting Arctic species in the subfamily Oncocnemidinae; the nearest UK species would be *Calophasia lunula* (Hufnagel) the Toadflax Brocade. *Sympistis lapponica* (Thunberg), and *S. nigrita* (Boisduval) ssp. *zetterstedti* Staudinger are high mountain species. They are essentially small and black and fly very fast a few centimetres from the ground. I have watched *S. zetterstedti* resting on flat rocks, presumably to absorb heat, and then dashing off wildly. It is supposed to visit flowers, but I did not witness this. I found later on in the afternoon at around 16.00h that they could be found, as could *S. lapponica,* at rest or *in copula* in crevices in the rocks or on bare sheltered ground. They were abundant in the mountains north of Tornetrask when I visited. *Sympistis lapponica* tends to fly later at night than we were able to stay on the mountain and that could account for their seeming comparative scarcity. *Sympistis heliophila* (Paykull) is ubiquitous in Lapland, starting up from the ground about a metre in front of you and dashing a few metres before settling again. It is found on dry moors, wet moors and mountains up to mid altitude, sometimes in such numbers that there are always two or three to be seen in flight. We only found one specimen of the fourth of this genus, *Sympistis funebris* (Hübner) and this was kicked up from wet moorland at Krokvik. When we showed the moth to a passing entomologist who had seven visits to the area to his name, he had never seen one so we presume it is uncommon. It is certainly a local species both here and in the Alps where it also occurs, but at altitudes above 2,000 metres (Ronkay & Ronkay, 1995). It is interesting to reflect that in the UK the idea of a 'passing entomologist' may be bizarre, but in Lapland it is a commonplace occurrence to run into others carrying nets. When in response to abuse hurled at me for carrying a net in Dorset a few days after returning from Lapland in 2010, I growled back that where I had just come from, everyone carried a net, it wasn't too far from the truth.

Lasionycta staudingeri, a congener of our *L. imbecilla* (F.), The Silurian, is easily confused with *S. zetterstedti* and flies in similar places and in a similar manner; we encountered it only at Gronnasen above the village of Gargia in Norway. It is another small, inconspicuous species which is easily overlooked and must be closely examined to confirm its identity. It is confined to the mountains, but has populations in Siberia and North America.

There are two more species of small, grey noctuid moths in the mountains which are also special to this area. *Xestia* (*Schoyenia*) *lyngei* (Rebel) and *X.* (*S.*) *quieta*

(Hübner). *Xestia lyngei* subspecies *lankialai* (Grönblom), (Fibiger, 1993) is confined in Europe to the mountains of north Sweden and those adjoining in Finland. It is another circumpolar species. It is found around 1,250 metres on Nissuntjarro and also north of Tornetrask on only the highest mountains. It flies in the afternoon sun and visits pads of *Silene acaulis*. Having similar habits but not quite so local, is *X. quieta* which we have seen most often at Gronnasen. Both of these moths are hard to encounter as the weather has to be right on the right day, but *X. lyngei* can be present in large numbers.

More exciting Xestias are found back at lower level in Jukkasjarvi. Here, long nets come into their own for *Xestia* (*Anomogyna*) *borealis* (Nordstrom), *X.* (*A.*) *gelida* (Sparre-Schneider) and *X.* (*A.*) *speciosa* (Hübner) as well as *Lasionycta skraelingia* and *L. secedens* . All of these species fly high round the spruce. One gets to know the species by their flight pattern but often the "*skraelingia* season" as it was described to me by Swedish lepidopterists we met there, will only last a few nights and a good night's return for five hours knee deep in swampy water might be three or four moths. Some of these species, as well as the *Xestias* that fly closer to the ground, *X.* (*A.*) *distensa* (Eversmann), *X.* (*A.*) *laetabilis* (Zetterstedt) and *Xestia* (*Anomogyna*) *alpicola alpicola* (Zetterstedt) will come to wine and the flowers of Labrador-tea, but in my experience, sparingly at best. Set specimens of *laetabilis* and *distensa* are difficult to tell apart and must be dissected for a firm determination (Fibiger, 1997), but the moths have very distinctive flight behaviours. Apparently it was the search for *X. gelida* which first drew entomologists to these woods at Jukkasjarvi, "the Ham Street of the North" which were then found to be so very rich.

On the low *Dryas* heath at Bjorkliden occurs *Xestia* (*Pachnobia*) *lorezi* (Staudinger), a species which is found as a different subspecies in the Alps, and also *X.* (*P.*) *tecta* (Hübner) which is confined to the north and is very variable. Both species fly very fast over the *Dryas* at night and are very difficult to intercept; for the expenditure of sixteen man-hours effort over two nights in 2010 we were rewarded with netting one *tecta*!

These are just a few of the very many interesting species one may encounter in Arctic Lapland but in the appendices are listed the butterflies and moths of special interest in this area of which I have any personal experience, together with notes which may help the visitor to find them.

I hope this brief introduction may whet the appetite of some readers to visit Lapland for themselves and sample, not only the moths, but the rich heritage of the area. The references below include books and papers not specifically mentioned in the address but have proved useful in the modern study of Lepidoptera in Lapland.

References

Aarvik, L., Hansen, L. O. & Kononenko, V. 2009. *Norges Sommerfugler*. Norsk Entomologisk Forening, Oslo. (A hand book of Norwegian Macro Lepidoptera with much useful general information.)

Agassiz, D. J. L., Beavan, S. D. & Heckford, R. J. 2013. *A checklist of the Lepidoptera of the British Isles*. Royal Entomological Society, London. (Referred to for nomenclature.)

Blunt, W. 1971. *Linnaeus, the Compleat Naturalist*. Frances Lincoln Limited, London. 287pp.

Bolotov, I. N., Yu, M., Sofarov, Y. S. & Artyom, A. 2013. Occurrence of *Borearctia menetreisii* (Eversmann, 1846) (Erebidae: Arctiinae) in Northern European Russia: a new locality in a disjunct species range. *Nota Lepidopterologica* **36**: 65–76.

De Freina, J. J. & Witt, T. J. 1987–2001. *Die Bombyces und Sphinges der Westpalaearktis*, vol 1–3. Edition Forschung und Wissenschaft.

Fibiger, M., 1993. *Noctuidae Europaeae* Vol 2. Entomological Press, Sorø. P134–156.

Fibiger, M., 1997. *Noctuidae Europaeae* Vol 3. Entomological Press, Sorø. P174–198.

Goater, B. 1998. Swedish Lappland, June–July 1996. *Entomologist's Record & Journal of Variation* **110**: 55–67.
Goater, B., Nuss, M. & Speidel, W. 2005. *Microlepidoptera of Europe, Vol 4. Pyraloidea 1.* Apollo Books, Stenstrup. (Covers identification of all the pyralids included in the appendix.)
Hausmann, A. 2011–2012. *The Geometrid Moths of Europe*. Vols 1–4. Apollo Books, Denmark. (Covers identification of geometers referred to in the text and appendix.)
Henrikson, H. J. & Kreutzer, I. B. 1982. *The Butterflies of Scandinavia in Nature*. Skandinavisk Bogforlag, Odense. 215pp.
Hodkinson, I. D. & Bird, J. M. 1998. Host-specific insect herbivores as sensors of climate change in Arctic and Alpine environments. *Arctic Alpine Research* **30**: 78–83.
Murzin, V. 2003. *The Tiger Moths of the former Soviet Union*. Pensoft, Bulgaria. 243pp.
Palm, E. 1986. *Nordeuropas Pyralider*. Fauna Bøger. Kobenhavn. 287pp.
Pickles, A. J. 2005. Collecting in Lappland, June & July 1994. *Entomologist's Record & Journal of Variation* **117**: 207–220.
Pullman, P. 1995. *Northern Lights*. 399pp. Scholastic Ltd.
Ratcliffe, D. 2005. *A Lapland Natural History*. 287pp. Frances Lincoln Ltd, London. (Much general information about the geology and flora of the area.)
Ronkay, G. & Ronkay, L. 1995. *Noctuidae Europaeae* Vol 7. Entomological Press, Sorø. 224pp.
Rowland-Brown, H. 1906. Some notes on Scandinavian and Lapland butterflies. *The Entomologist* **39**: 220–227 & 242–247.
Sheldon, W. G. 1911. *Lepidoptera of the Swedish provinces of Jemtland and Lapland. The Entomologist* **44** and **45**: 23–27, 65–67.
Sheldon, W. G. 1912. *The Lepidoptera of the Norwegion Provinces of Odalen and Finnmark. The Entomologist* **45**: 309–315; **46**: 11–14.
Skou, P. 1984. *Nordens Målere*. Fauner Bøger and Apollo Bøger, København. 332p. (Covers Geometridae.)
Skou, P. 1991. *Nordens Ugler*. Apollo Bøger, Stenstrup. 565p. (Covers Noctuidae and Erebidae)
Slamka, F., 2006–2013. *Pyraloidea Europas, Vols 1–3*. Bratislava.
Smith, J. E. 1811. *Laehesis lapponica or a Tour in Lappland* (translation of *Iter lapponicum* by C. Linnaeus) 2 vols. (London).
Svenson, I. 1993. *Fjärilkalender, Lepidoptera-calendar*. Författare, Sweden. (Emergence times of Lepidoptera in Scandinavia.)
Tshikolovets, V. 2011. *Butterflies of Europe and the Mediterranean area*. Czech Republic.
Witt, T. J. & Ronkay, L. 2011. *Noctuidae Europaeae* Vol 13. Entomological Press, Sorø. 448pp.

Note: Material of relevance to Scandinavian noctuids will be found throughout the 13 volumes of *Noctuidae Europaeae*.

Other resources

The BENHS Torstenius reference collection of Scandinavian Lepidoptera which is housed at Dinton Pastures.
Many websites now deal with Lepidoptera from this part of the World, including:

www. lepidoptera.se
www. Svenska_fjarilar.se
www. lepidoptera.no
www. nic.funet.fi

Appendix

I list some of the butterfly, macro-moth and pyralid species encountered in Arctic Lapland and which the visitor with limited time has a chance of seeing. I do not claim this is at all complete. The list is subjective and restricted to species of particular interest in my opinion, either because of their differing forms from those found further south or because of their restricted range. I include brief notes from my personal experience and hope this may enable the visiting lepidopterist to make the most of their time.

Papilionoidea

Family Hesperiidae

Subfamily Pyrginae	
Pyrgus centaureae (Rambur, 1839)	Flies over wet bogs as at Krokvik.
Pyrgus andromedae (Wallengren, 1853)	A mountain species in North Sweden but seen at sea level at Porsanger.
Subfamily Heteropterinae	
Carterocephalus palaemon (Pallas, 1771)	One specimen at Jukkasjarvi. Resembles extinct form from England rather than Scottish form.
Subfamily Hesperiinae	
Hesperia comma (Linnaeus, 1758)	We did not encounter this but there is a small dark form *catena* Staudinger, 1861 which is found in Troms and Finnmark.

Family Pieridae

Pieris napi (Linnaeus, 1758)	This is a notoriously difficult species or species group.
subspecies *adalwinda* Fruhstorfer, 1909	A spectacularly dark form flies in the mountains near Abisko and a form with more yellow females which has been referred to as *bicolorata* Petersen, 1949 at lower altitudes. Ova can be found on crucifers in the ditches at Bjorkliden.
Colias tyche (Bober, 1912)	
subspecies *werdandi* Zetterstedt, 1840	See comments in main text.
Colias palaeno (Linnaeus, 1761)	Flies over the bogs between Kiruna and Abisko and up to the Arctic Ocean.
Colias hecla Lefèbvre, 1836	
ssp. *sulitelma* Aurivillius, 1890	See comments in main text.

Family Nymphalidae

Subfamily Satyrinae	
Erebia ligea (Linnaeus, 1758)	We have seen the small dark f. *dovrensis* Strand further south, but not seen this form which flies from mid-July in Lapland.
f. *lapponica*	

Erebia polaris Staudinger, 1871	See comments in main text.
Erebia embla (Thunberg, 1791)	In wet forest bogs and flies from early June. We have only encountered worn specimens at Jukkasjarvi.
Erebia disa (Thunberg, 1791)	Seen commonly over wet bogs but also on mountains in Norway where it appears more sparingly.
Erebia pandrose (Borkhausen, 1788)	Encountered in some numbers on the shores of Porsanger Fjord. A very different form from that in the Alps.
Oeneis jutta (Hübner, 1806)	Seen in extremely wet areas where one has to wade, knee deep. The butterfly sits on the trunks of spruces at the edge of this terrain.
Oeneis bore (Schneider, 1792)	Very scarce in Sweden but found on the mountain at Gronnasen. On the bare mountain tops it is extremely difficult to approach.
Oeneis norna (Thunberg, 1791)	One seen to the south of Abisco at some 600 m. Several on the north Norway coast where they behave like typical Graylings.
Subfamily Nymphalinae	
Aglais urticae (Linnaeus, 1758) f. *polaris* Staudinger, 1871	We encountered webs of larvae more or less where ever we saw nettles, near Kiruna, at Abisko and on the northwest Norway coast. The butterflies are slightly smaller and darker than the usual British form.
Subfamily Argynninae	
Clossiana (*Proclossiana*) *eunomia* (Esper, 1799) ssp. *osseanus* (Herbst, 1800)	Common in very wet habitats near Kiruna.
Clossiana (*C.*) *euphrosyne* (Linnaeus, 1758) f. *lapponica* Esper	See comments in main text.
Clossiana selene (Denis & Schiffermüller, 1775)	Widespread but not as frequent as *C. euphrosyne*.
Clossiana thore (Hübner, 1803) ssp. *borealis* (Staudinger,1861)	We failed to see this species despite many hours searching at Bjorkliden and in the valley below Gronnasen. Associated with yellow violets and globe flowers. We suspect we were too early.
Clossiana freija (Thunberg, 1791)	Common at Krokvic and on the mountain at Gronnasen.
Clossiana chariclea (Schneider, 1794)	See comments in main text.
Clossiana improba (Butler, 1877)	

ssp. *improbula* Brykner, 1920	See comments in main text.
Clossiana frigga (Thunberg, 1791)	In wet bogs as at Jukkasjarvi where we saw it abundantly.
Clossiana polaris (Boisduval, 1828)	See comments in main text.
Boloria napaea (Hoffmannsegg, 1804)	As in the Alps this is a mountain species.
ssp. *frigida* Warren, 1944	We saw it in the hills on both sides of Lake Tornetrask.
Boloria aquilonaris (Stichel, 1908)	Less frequent than *B. napaea* and usually in wetter habitats but we saw it also on the *Dryas* heath at Bjorkliden.
Subfamily Melitaeinae	
Euphydryas iduna (Dalman, 1816)	See comments in main text.

Family Lycaenidae

Subfamily Theclinae	
Callophrys rubi (Linnaeus, 1758)	A smaller darker form, *nordlandica* Strand, 1901 occurs throughout the area in a variety of habitats.
Subfamily Lycaeninae	
Lycaena (*L.*) *phlaeas* (Linnaeus, 1761)	
ssp. *polaris* Courvoisier, 1911	Seen in disused quarries near Alta Fjord.
Lycaena (*Helleia*) *helle* (D. & S., 1775)	We have only seen this species just south of the Arctic Circle where it was flying in a forest glade, but it is reputedly found in Norwegian Lapland.
Lycaena hippothoe (Linnaeus, 1761) ssp. *stiberi* Gerhard, 1853	This lowland butterfly extends to the north of Norway but has avoided us.
Plebejus (*P.*) *idas* (Linnaeus, 1761)	Abundant in the roadside ditches near Abisko.
Plebejus (*Vacciniina*) *optilete* (Knoch, 1781)	Seen near Kiruna in wet habitats.
Plebejus (*Agriades*) *aquilo* Boisduval, 1832	This proved difficult to find south of Tornetrask but one was located by a rocky outcrop on *Dryas* heath at Bjorkliden. It was abundant on the mountains to the north of the lake, often at rest on grass stems and seemingly hanging on grimly against the wind.

Pyraloidea

(See Goater, Nuss & Speidel, 2005)

Family Pyralidae

Catastia marginea (Denis & Schiffermüller, 1775)	Only seen in Finland on sandy soil.
Pyla fusca (Haworth, 1811)	Abundant in open areas in North Sweden.
Polopeustis altensis (Wocke, 1862)	Abundant in the roadside ditches near Abisko.

Family Crambidae

Loxostege commixtalis (Walker, 1866) subspecies *septentrionalis* (Tengström, 1869)	Not seen by us.
Loxostege ephippialis (Zetterstedt, 1840)	Not seen, but worth searching *Dryas* heath at Bjorkliden.
Pyrausta porphyralis (D. & S., 1775)	Found throughout the area.
Anania terrealis (Treitschke, 1829)	Not seen by us north of the Arctic circle but found a little further south in similar localities to *A. funebris*.
Anania funebris (Ström, 1768)	Seen at *Solidago* growing in roadside ditches and banks.
Udea nebulalis (Hübner, 1796)	Not seen by us.
Udea decrepitalis (Denis & Schiffermüller, 1775)	Common in open birch woods near Abisko.
Udea inquinatalis (Lienig & Zeller, 1846)	Common in open birch woods near Abisko.
Udea hamalis (Thunberg, 1788)	Not seen by us but very distinct. Boreomontane.
Eudonia murana (Curtis, 1827)	Boreomontane.
Eudonia alpina (Curtis, 1850)	Open bogs.
Eudonia sudetica (Zeller, 1839)	Boreomontane.
Gesneria centuriella (D. & S., 1775)	Jukkasjarvi and near Alta in Norway.
Crambus ericellus (Hübner, 1813)	Mountains north of Lake Tornetrask
Crambus alienellus (Germar & Kaulfuss, 1817)	Mountains north of Lake Tornetrask
Agriphila biarmica (Tengström, 1865)	Not seen by us.
Catoptria permutatella (Herrich-Schäffer, 1848)	Mountains north of Lake Tornetrask
Catoptria margaritella (D. & S. 1775)	Mountains north of Lake Tornetrask
Catoptria furcatella (Zetterstedt, 1840)	Mountains north of Lake Tornetrask
Catoptria maculalis (Zetterstedt, 1839)	Wet bogs as at Jukkasjarvi.
Pediasia truncatella (Zetterstedt, 1840)	Wet bogs, but not seen by us.

Drepanoidea

Family Drepanidae

Falcaria lacertinaria (Linnaeus, 1758)	The form flying in spruce woods as at Jukkasjarvi is larger and paler than that seen in England.

Lasiocampoidea

Family Lasiocampidae

Eriogaster arbusculae Freyer, 1849	We encountered larvae of this species commonly further south in Norway on the Doverfeldt. However the larvae found in such places as Jukkasjarvi were all *E. lanestris* (Linnaeus, 1758)
Cosmotriche lobulina (D. & S., 1775)	Two flying high and straight between trees at Jukkasjarvi.

GEOMETROIDEA

Family Geometridae

Subfamily Geometrinae

Jodis putata (Linnaeus, 1758) — Flying in late afternoon in open woodland by the road north towards Kiruna. Not seen elsewhere.

Subfamily Sterrhinae

Scopula frigidaria (Möschler, 1860) — Took a long detour in Finland towards the Russian border to try and find this species but the moths I found in open dry woodland turned out to be only a small form of *Scopula ternata* Schrank, 1802.

Subfamily Larentiinae

Xanthorhoe annotinata (Zetterstedt, 1839) — Jukkasjarvi woodland, flying in the evening.

Xanthorhoe montanata (D. & S., 1775) ssp *lapponica* Staudinger, 1871 — The specimens from the north of Norway are almost devoid of markings and may be disturbed from roadside vegetation.

Xanthorhoe decoloraria (Esper, 1806) ssp *arcticaria* Keferstein, 1835 — I have a short series from Iceland and those I found in Norway are smaller and darker with less contrast between the ground colour and the forewing bar.

abrasaria (Herrich-Schäffer, 1855) — In more open ground than *X. annotinata* but common between Kiruna and Abisko.

Epirrhoe hastulata (Hübner, 1790) — In birch woodland northwest of Kiruna. Not easy to differentiate from *Rheumaptera subhastata* at first glance.

Psychophora sabini Kirby, 1824 — This is thought to be a scarce species but on one occasion I found it swarming near the top of Gronnasen mountain in the early morning.

Entephria polata (Duponchel, 1830) — Flies over the *Dryas* at Bjorkliden in the early evening. Flies quite high above the ground and straight.

Entephria byssata (Aurivillius, 1891) — Flies later in the year than *E. polata*.

Entephria nobiliaria (Herrich-Schäffer, 1852) — I have only encountered this once near the Norwegian Swedish border west of Abisko. On wet rocks with saxifrage.

Entephria flavicinctata (Hübner, 1813) — Not seen by us.

Entephria caesiata (D. & S., 1775) — Common on sand bars on the River Anarjohka.

Dysstroma infuscata (Tengström, 1869) — Encountered in birch scrub throughout the area.

Heterothera serraria (Lienig & Zeller, 1846)	This beautiful moth is a Jukkasjarvi speciality. It flies high about the spruces from early evening until midnight.
Colostygia turbata (Hübner, 1799)	Flies in late afternoon in the Kiruna area but we failed to find it.
Rheumaptera hastata (Linnaeus, 1758)	The form resembles that from Southern England rather than Scotland.
Rheumaptera subhastata (Nolcken, 1870)	Flies together with *hastata* in birch woods between Kiruna and Abisko.
Epirrita autumnata (Borkhausen, 1794)	See comments in main text.
Perizoma minorata (Treitschke, 1828) ssp. *norvegica* Prout, 1906	Seen on sand bars on the River Anarjohka.
Perizoma blandiata ([Denis & Schiffermüller], 1775) ssp. *perfasciata* Prout, 1915	In the roadside ditches near Abisko.
Perizoma albulata ([Denis & Schiffermüller], 1775) ssp. *thules* (Weir, 1880)	In various localities from Abisko to Porsanger. The form has much reduced markings.
Eupithecia analoga Djakonov, 1926	Not seen by us.
Eupithecia fennoscandica Knaben, 1949	On hills to the north of Tornetrask
Eupithecia actaeata Walderdoff, 1869	Not seen by us.
Eupithecia gelidata Möschler, 1860 ssp. *hyperboreata* Staudinger, 1861	On low hills near Porsanger Fjord and elsewhere on the Norwegian coast.

Subfamily Ennominae

Macaria brunneata (Thunberg, 1784)	Reaches into the south of the area where it flies in afternoon sun as in Scotland.
Macaria carbonaria (Clerk, 1759)	Seen both in North Sweden and at Porsanger.
Pygmaena fusca (Thunberg, 1792)	Abundant on the *Dryas* heath at Bjorkliden where it crawled rather than flew.
Selenia dentaria (Fabricius, 1775)	The form at Jukkasjarvi is large and pale.
Ematurga atomaria (Linnaeus, 1758)	A small grey form flies over the drier parts of the bogs at Krokvic.
Parietaria vittaria (Thunberg, 1788)	This species was found in many places between Jukkasjarvi and Porsanger in seemingly unrelated habitats.
Glacies coracina (Esper, 1805)	See comment in main text.

NOCTUOIDEA

Family Notodontidae

Cerula vinula (Linnaeus, 1758) f. *phantoma* (Dalmain, 1823)	We have not encountered this species and probably searching *Salix* or aspen later in the year would be worthwhile. The form is spectacular.

Family Erebidae

Subfamily Lymantriinae	
Dicallomera fascelina (Linnaeus, 1758)	
f. *obscura* Zetterstedt, 1839	Larvae found at Krokvic. The form is smaller and less well marked than that from the British Isles.
Subfamily Arctiinae	
Phargmatobia fuliginosa (Linnaeus, 1758)	Found in several places including Jukkasjarvi. Extremely dark, much more so than Scottish specimens.
Parasemia plantaginis (Linnaeus, 1758)	form *hospita* (D. & S.) predominates with females in which yellow is replaced with red.
Arctia lapponica (Thunberg, 1791)	See comment in main text.
Acerbia alpina (Quensel, 1802)	See comment in main text.
Borearctia menetriesi (Eversmann, 1846)	Mythical beast.
Holoarctia puengeleri (O. Bang-Haas, 1927)	
ssp *fridolini* Torstenius, 1971	See comment in main text.
Grammia quenseli (Paykull, 1793)	See comment in main text.
Subfamily Herminiinae	
Polypogon tentacularia (Linnaeus, 1758)	A very pale form flies in the evening at Jukkasjarvi and Krokvik.
Subfamily Erebinae	
Catocala adultera Ménétriés, 1856	Recorded infrequently from the north west of the area and very scarce in Sweden.

Family Noctuidae

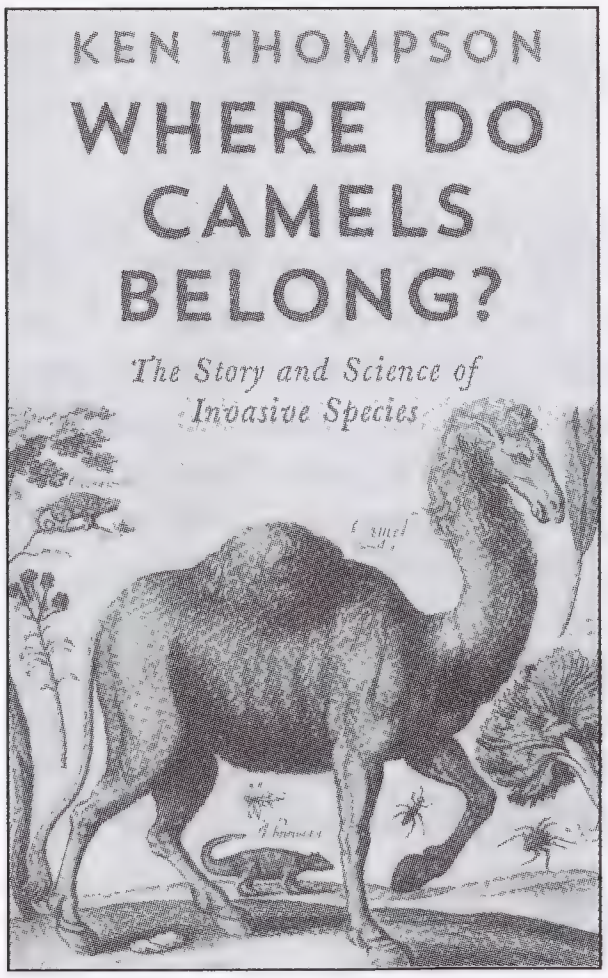
Subfamily Plusiinae	
Syngrapha parilis (Hübner, [1809])	I have taken this on the mountain at Gargia and also at Krokvik.
Syngrapha hochenwarthi (Hochenwarth, 1785)	
ssp. *lapponaris* (Schulte, 1952)	See comment in main text.
Syngrapha microgamma (Hübner, [1823])	in light open woods to the south of Kiruna.
Subfamily Acronictinae	
Acronicta auricoma (D. & S., 1775)	A species which does come to wine baits at Jukkasjarvi and Bjorkliden.
Acronicta cinerea (Hufnagel, 1766)	What we once thought of as *A. euphorbiae* in the British Isles is now listed as this species although I am not sure that sufficient work to prove this has been carried out. It should be looked for in the south of Arctic Lapland.
Subfamily Oncocnemidinae	
Sympistis funebris (Hübner [1809])	See comment in main text.
Sympistis lapponica (Thunberg, 1791)	See comment in main text.
Sympistis heliophila (Paykull, 1793)	See comment in main text.
Sympistis nigrita (Boisduval, 1840)	See comment in main text.

Subfamily Xyleninae	
Apamea schildei (Staudinger, 1901)	An interesting and controversial taxon which should be looked for later in the year.
Hyppa rectilinea (Esper, [1788])	Visits wine baits commonly at Jukkasjarvi. Much smaller and greyer than the familiar Scottish form.
Subfamily Hadeninae	
Anarta melanopa (Thunberg, 1791)	This is very distinct from either of the Scottish or Alpine subspecies and was found flying in afternoon sunshine at Gronnasen.
Coranarta cordigera (Thunberg, 1788)	Comes to Labrador Tea in the afternoon over bogs from Jukkasjarvi to Abisko.
Polia conspicua (A. Bang-Haas, 1912) ssp. *sabmeana* Mikkola, 1980	In north Finland where associated with dwarf birch. Flies late at night. Not seen by us.
Polia richardsoni (Curtis, 1835)	On mountains where it reputedly visits flowers.
Polia lamuta (Herz, 1903)	See comment in main text.
Lasionycta skraelingia (Herrich-Schäffer, 1852)	See comment in main text.
Lasionycta secedens (Walker, 1858)	Flies high round Spruces in company with *L. skraelingia*. It may be possible to make out a flash of yellow from the underwings.
Lasionycta dovrensis (Wocke, 1864)	Looking like a slightly larger *L. staudingeri* this species should be sought on the hills near Abisko and also in Finland. We failed to find it.
Lasionycta staudingeri (Aurivillius, 1891)	See comment in main text.
Subfamily Noctuinae	
Diarsia mendica (Fabricius, 1775) ssp. *borealis* (Zetterstedt, 1839)	A fascinating species with greatly differing populations. This subspecies is radically different from all our British subspecies and is much smaller and of a rich dark brown. I have found it on Labrador tea both at night and in late afternoon.
Xestia (*Pachnobia*) *lorezi* (Staudinger, 1891)	Bjorkliden is a well known locality for it but we did not see it on any of our visits.
Xestia (*Pachnobia*) *tecta* (Hübner, [1808])	This species was reported as common in the rides at Jukkasjarvi but we only saw it over *Dryas* at Bjorkliden.
Xestia (*Pachnobia*) *borealis* (Nordström, 1933)	High flier at Jukkasjarvi.
Xestia (*Pachnobia*) *distensa* (Eversmann, 1851)	See comment in main text.
Xestia (*Pachnobia*) *laetabilis* (Zettersedt, [1839])	See comment in main text.

Xestia (*Pachnobia*) *gelida* (Sparre-Schneider, 1883)	See comment in main text.
Xestia (*Pachnobia*) *speciosa* (Hübner, [1813]) ssp. *arctica* (Zetterstedt, 1839)	High flier at Jukkasjarvi but it is unclear if these are true *arctica* or whether they only occur further north. Michael Fibiger (pers. comm.) told me that those from North Cape were much smaller and darker and could be seen silhouetted against the sky if one lay down on the cliff edge. Not for the faint hearted!
Xestia (*Pachnobia*) *alpicola* (Zetterstedt, [1839])	Fairly frequent over the area and visits wine. A subtle grey beauty which makes our subspecies look brash.
Xestia (*Pachnobia*) *lyngei* (Rebel, 1923)	See comment in main text.
Xestia (*Pachnobia*) *quieta* (Hübner, [1813])	See comment in main text.

SHORT COMMUNICATION

Failed escape behaviour of the Square-spot Rustic *Xestia xanthographa* (D. & S.) (Lep.: Noctuidae) – I was recently requested to mow the lawns at a property in Bicknor (TQ86/58) on the top of the North Downs near Sittingbourne, Kent. Pushing the mower over quite tall, mainly lawn grass in the early afternoon proved quite an effort, but my progress was frequently interrupted by the presence of adult *X. xanthographa* trying to fly away and avoid the cutter blades. The adult moths were highly active with wings in full motion, but with little serious intent to fly away from the immediate vicinity; individuals preferring either to flutter through the vegetation a little or to fly in a circular motion around the odd taller grass or flower stem (and after 10 seconds or more, eventually to escape). Few were successful in properly flying away from the path of the mower. Of 40 individuals encountered, only three (<8%) would have managed to escape the cutter blades if mowing had continued uninterrupted. Clearly, the ability to fly is not always used to full advantage. Daytime disturbance of the adult moth which is nocturnal resulted in a short flight which may well have been sufficient to survive minor disturbance by wild or domesticated mammals in the past but not the action of modern mechanical mowers with multiple blades designed to cut vegetation into small pieces. Populations of the moth would be unsustainable in the long term with such high levels of adult mortality (>90%) in a habitat where daytime mowing is the norm. It is therefore most likely that populations of this moth were substantially higher in grassland before the advent of agricultural and domestic mowing machinery and have been declining ever since. The species habitat in standard works is described as 'all types of grassland', I suspect based largely but not entirely on observations of where adult moths occur simply because moths are easier to observe than larvae. Exactly where and on what plant species *X. xanthographa* larvae feed in the wild and at different stages of their development have yet to be accurately determined. After all, there are at least 49 different types of grassland plant community recognised in the UK National Vegetation Classification system; *X. xanthographa* is unlikely to develop in all of them. – JOHN BADMIN, Coppice Place, Selling, Kent ME13 9RP.



BOOK REVIEW

Where do camels belong? The Story and Science of Invasive Species by Ken Thompson. (Profile books, 2014). 252 pp. Softback £10.99. ISBN 978-1-78125.

If you require a jolly good read over Christmas, about biology rather than just insects, this book with lots of provocative ideas is the one for you. It is written by a British ecologist, who in the recent compilation by the British Ecological Society of its 100 most influential papers published by the society over the last century is cited three times (more than anyone else) and so someone worth listening to. For example he was involved in the first group to map the distribution and abundance of insects across a city landscape in the UK.

Here he reviews the case for the native-foreign/alien dichotomy – native 'good' – foreign 'bad' and explores the background to the study of 'nativeness' and how this influences our behaviour, even today (think exhibition). The concept, in the UK at least, begins with the botanist H. C. Watson (of vice-county fame). In the mid-nineteenth century he attempted to produce a list of native species in part to prevent competition from vainglorious botanists claiming ever new discoveries including some that unscrupulous botanists may have planted and 'found' for themselves. Later, other biologists recognised that alien species were just very good at filling gaps in our flora and fauna and were not necessarily 'good' or 'bad'. However there was a gear change in ideas following the publication of Charles Elton's book '*The ecology of invasions by animals and plants*' in 1958, which for many is taken as the beginning of the study of invasive species. Ground breaking as this publication was, it set the tone for blaming or at least attempting to blame introduced species for almost any environmental problem you wish to mention.

Four invasive species case studies on the brown tree snake, zebra mussel, tamarisk and purple loosestrife are presented to examine the myths of invasion and whether these species are guilty of huge environmental destruction as charged. These are fascinating accounts, comprising a mix of evidence for and against their dastardly roles, but I won't reveal which is the good girl, you will have to read the book.

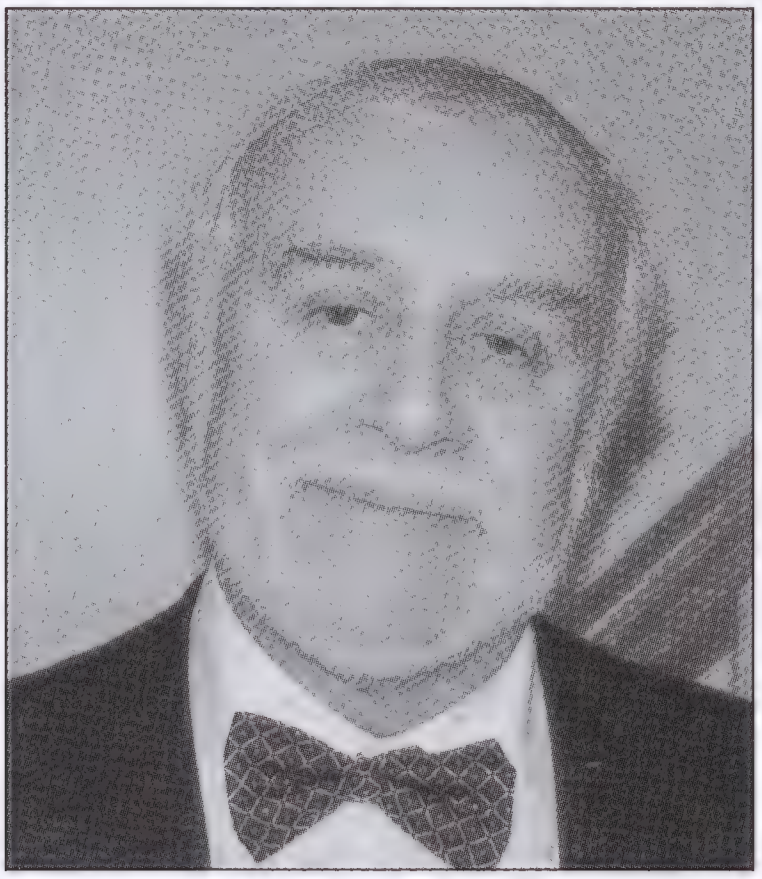
A large section is devoted to examining why so many biologists tend to promote the negative view of alien species and the huge sums of funding available for eradication programmes across the globe. I wonder whether the author's views on all this might be a little different if his home garden was overgrown with Japanese knotweed. Recognising the futility of trying to achieve complete eradication of established species, the author discusses alternative approaches to control such as long term suppression of invasives through the use of biocontrol agents. Examples include the promising work of CABI in releasing the psyllid *Aphalara itadori* for control of Japanese knotweed in the UK.

Overall this book has fewer references than I would like and the illustrations, although functional, leave a lot to be desired, but all in all, it is an extremely interesting and entertaining read.

JOHN BADMIN

OBITUARY

JOHN ROCHE
1945–2014



John passed away on 8th September in the John Radcliffe hospital, Oxford, after a period of illness. He joined the Society in 1962 a few months before his 17th birthday and became a Special Life member in 2012 having been a member for 50 years which included two years on Council from 1971 to 1972.

John was born in Barnhurst, Kent on 2nd December 1945 and attended Dartford Grammar School before going to Salford University. As a child he was interested in nature and around the age of 10 an encounter with a Death's-head Hawk-moth *Acherontia atropos* may have fired his interest in Lepidoptera. During his childhood in Bexley Heath he became known to Richard Ford of Watkins & Doncaster and used to work there to earn pocket money during school holidays. He married Jean in 1968 and they moved to Sidcup, Kent and he was very active recording Lepidoptera, as well as taking a mathematics and computing degree at London University. His active interest in Lepidoptera continued with moves to Canterbury and Chestfield, Kent, the birth of sons John (1975) and Richard (1980), and a Master's degree in Biometrics, at the University of Kent. He also started work in the pharmaceutical industry, which with increasing responsibility, took him to California and later Switzerland. He ended up as a Vice President for Syntex Pharmaceuticals and later Roche after the two merged. Unfortunately with the increased responsibilities with his work and family there was less time for entomology, despite an enduring interest.

In the early days John soon became particularly interested in micro-moths, probably as a result having been taken under the wing of eminent lepidopterists when he first joined the Society as a teenager. He became particularly interested in the Scythridae and was the first to recognise *Scythris potentillella* (Zeller) in the UK, in Suffolk in 1977. Other notable discoveries were *Catoptria osthelderi* de Lattin, found at light in his garden in Bexley Heath on 29th July 1962, which was new to Britain. In 1983 another species new to Britain, the pyralid *Zophodia grossulariella* (=*convolutella*) (Hübner) was discovered on 30th April at light in his garden in Chestfield, east Kent.

His micro-moth collection plus some journals and books have been donated to the Society for which we thank his family.

MARTIN ALBERTINI

SELECTED BIBLIOGRAPHY

Roche, J. 1963. *Catoptria osthelderi* de Lattin, 1950: in Britain. *Entomologist's Record* **75**: 142.
Roche, J. 1978. In The Annual Exhibition 1977 report – Specimens of *Scythris potentillella* (*Zeller*). *Proceedings of the British Entomological and natural History Society* **11** (1978): 14.
Roche, J. 1984. *Zophodia convolutella* (Huebner) (Lep.: Pyralidae) new to Britain. *Entomologist's Record* **96**: 177.

SOCIETY NEWS

New members of the Society 2013–2014

Now that we no longer hold regular formal indoor meetings of the Society, the election of members to the Society is undertaken by Council at committee meetings. The following new members have joined the Society since the previous announcement:

Mr P. D. J. Hugo of Stroud, Gloucestershire, interested in Lepidoptera (formerly member 1974–98); Miss S. Atkinson of Amesbury, Wiltshire, interested in Coleoptera, Arachnida and Hymenoptera; Mr L. J. M. Guillot of London, interested in entomology (junior member); Miss E. D. Moss of Beverley, Yorkshire, interested in Hymenoptera, pollination and ecology; Mrs S. L. Hiatt of Telford, Shropshire, interested in invertebrates, particularly Hemiptera and Lepidoptera; Ms L. M. Todd, of London, interested in all vertebrates and invertebrates; Mr J. C. Weir of Falkirk, Stirlingshire, interested in entomology and evolutionary biology; Dr M. V. Angel of Farnham, Surrey, interested in Lepidoptera; Mr D. Morton of Warsop, Nottinghamshire, interested in Lepidoptera, Syrphidae and Odonata; Dr M. Robinson of Malvern, Worcestershire, interested in entomology; Ms L. Rowley, of Northampton, interested in entomology, especially Coleoptera; Mr W. J. Lee of Braunton, Devon, interested in Coleoptera and Hymenoptera; Mr N. A. Littlewood of Aberdeen, interested in Lepidoptera, Hemiptera and more broadly in some other groups; Miss K. Dainton of Chalford, Gloucestershire, interested in entomology, particularly pest species; Mr J. Hands of Chipping Norton, Oxfordshire, interested in butterflies, moths and locusts (junior member); Mr R. N. Fleetwood of Clevedon, Somerset, interested in moths, butterflies and beetles; Mr R. A. Crump, of Reigate, Surrey interested in Lepidoptera; Mr D. J. Fullwood, of London, interested in Collembola; Mr A. J. Green, of Wilden, Bedfordshire, interested in entomology; Miss N. D. Guérin, of Brighton, interested in entomology; Mr R. W. Heath of Dundee, interested in Coleoptera, Diptera and Hymenoptera; Mr A. W. A. Messinger of Little Compton, Gloucestershire, interested in aculeate Hymenoptera, hoverflies and other groups; Dr Diana Westmoreland of Newport, Gwent, interested in moths, Hemiptera and hoverflies; Dr C. R. Betts, of Broadclyst, Devon, interested in Hymenoptera (especially bumblebees), insect flight, ecology, biodiversity, education and conservation; Mr A. Dittrich of Great Shelford, Cambridgeshire, interested in Auchenorrhyncha, Coleoptera and Aranae; Dr G. E. King, of Madrid, Spain, interested in Lepidoptera (especially Sterrhinae, Gelechiidae and Pyraloidea; Dr E. Slade, of Oxford, interested in ecology, conservation, ecosystem services, Coleoptera and Lepidoptera; Mr G. B. Summers, of London, interested in Lepidoptera; Mr J. Douglas of Hanworth,

Middlesex, interested in bumblebees; Mr C. M. Manley of Gowerton, near Swansea, interested in moths; Dr J. Stockan of Peterculter, Aberdeenshire, interested in Hymenoptera and Coleoptera; Miss G. Turney of Bagshot, Surrey, interested in all insects, especially Diptera, Hymenoptera and Odonata; Miss E. Bickford of Benfleet, Essex, general entomology; Mr M. W. Rhodes of Bristol, general entomology; Mr N. Gash of Southend, Essex, interested in moths and beetles.

The obligations book is now taken to regional, AGM and Annual Exhibition meetings of the Society, and members are encouraged to sign the book and be officially welcomed into the Society by the President on these occasions.

INVERTEBRATE LINK (JCCBI) GUIDANCE TO MINIMISE THE ACCIDENTAL TRANSFER OF ORGANISMS BETWEEN SITES

Unless the specific focus of a carefully planned translocation programme (e.g. Invertebrate Link, 2010; IUCN/SSC, 2013) or other approved management activities, the human-assisted movement of native taxa between sites is undesirable, and can disrupt biological recording and conservation efforts. The movement of non-native taxa between sites has the potential to be much more damaging, by accelerating the spread of invasive alien species that threaten native biodiversity, agriculture and other commercial activities, or even human health.

The UK's 2001 outbreak of Foot and Mouth Disease emphasised the impact of introduced livestock diseases and the severe measures that can be imposed to control their spread, with the culling of large numbers of farm animals, imposition of disinfection routines and closure of public rights of way. The recent discovery in the UK of *Dikerogammarus* spp., known to be highly damaging elsewhere in Europe, has re-emphasised the particular threat that non-native taxa can pose to freshwater ecosystems. Similarly, the recent arrival of *Chalara fraxinea*, the agent of Ash Dieback, has recalled the devastation caused by Dutch Elm Disease, providing a sobering reminder of the impact that plant pathogens can have on terrestrial ecosystems.

This Committee's *Code for Collecting* (Invertebrate Link, 2002) notes various measures to avoid environmental damage. Also, it strongly discourages the deliberate release of surplus captive-bred or reared stock of native species, except as part of a planned and approved translocation or reinforcement programme. However, it does not emphasise measures to minimise the accidental transfer of organisms between sites. This is an issue not only for collectors, as any entomological (or other) fieldwork provides a number of routes by which such movements can occur. The most obvious are the transfer of small organisms or propagules on the person, clothing or equipment of the fieldworker, or in material collected at one site and disposed of at another.

Invertebrate Link (JCCBI) encourages entomologists and others to observe the general advice to fieldworkers issued by the GB Non-Native Species Secretariat (currently available under the heading of *Biosecurity* at *https://secure.fera.defra.gov.uk/nonnativespecies/index.cfm?sectionid=58*) and to adhere to detailed guidance for particular situations, such as the *Check, Clean, Dry* advice for those working in aquatic environments (*https://secure.fera.defra.gov.uk/nonnativespecies/checkcleandry/index.cfm*) and guidance issued by the Forestry Commission with particular relevance to work in wooded habitats (*http://www.forestry.gov.uk/biosecurity*).

Key points are as follows:

- Where possible, avoid visits to areas where potentially damaging invasive species are known to occur or where their introduction could be the most detrimental

- Plan series of visits to minimize the risk of accidentally transferring species to sites where their introduction could be most damaging
- Keep access to a minimum – if practical, do not take vehicles onto premises; keep to established tracks and park vehicles on hard standing
- Arrive at the site with clean footwear, equipment and vehicles
- Make use of any facilities provided on the site to clean footwear, equipment and vehicles:
  - Ensure that footwear and equipment is clean (e.g. of soil and debris) *before* leaving the site.
  - Ensure vehicles are kept clean – in particular remove any accumulated mud *before* leaving the site
- After aquatic sampling, all wet clothing, footwear and equipment should be inspected, thoroughly cleaned, spread out and dried (ideally for 48 hours) before being re-used
- Except under appropriately planned and approved conservation programmes, material deliberately removed from a site (e.g. for extraction or rearing of specimens) should be destroyed after use

References

Invertebrate Link 2002. A Code of Conduct for Collecting Insects and Other Invertebrates. *British Journal of Entomology & Natural History* **15**: 1–6.

Invertebrate Link 2010. Invertebrate Translocation – A Code of Conservation Practice. *British Journal of Entomology & Natural History* **23**: 207–217.

IUCN/SSC 2013. *IUCN Guidelines for Reintroductions and Other Conservation Translocations. Version 1.0*. IUCN Species Survival Commission. Gland, Switzerland.

This guidance is endorsed by the following Invertebrate Link (JCCBI) member organisations: Amateur Entomologists' Society; Ancient Tree Forum; Bees, Wasps & Ants Recording Society; British Dragonfly Society; British Entomological & Natural History Society; British Myriapod & Isopod Group; Buglife – The Invertebrate Conservation Trust; Bumblebee Conservation Trust; Butterfly Conservation; Conchological Society of Great Britain & Ireland; Environment Agency; National Biodiversity Network Trust; National Trust; Natural England; People's Trust for Endangered Species; Royal Entomological Society; Royal Horticultural Society; Royal Society for the Protection of Birds; Scottish Natural Heritage.

SHORT COMMUNICATIONS

***Colladonus torneellus* (Zetterstedt) (Hemiptera: Cicadellidae) in Surrey (VC17).** – On 14.iv.2014, whilst surveying Dukes Warren, Surrey (TQ1443) (part of the National Trust's Leith Hill estate) I swept a couple of unfamiliar hoppers from a small patch of scrub in open dry heathland. These proved to be *Colladonus torneellus* a species without any conservation status but for which I was unable to find any previous Surrey records, and reference to the NBN Gateway showed that it is rarely recorded but is known from Kent. Dukes Warren is the highest heath in Surrey and was once part of an extensive 'moorland' landscape. – JONTY DENTON, 31 Thorn Lane, Four Marks, Hants GU34 5BX.

Notes on Irish caddisflies (Trichoptera) including three species new to Northern Ireland. – As work continues on the compilation of *A Catalogue and Atlas of the caddisflies (Trichoptera) of Ireland* (J. P. O'Connor, in prep.), some new and interesting discoveries have been made including three species new to Northern Ireland. Details are given below. The adults were identified using Barnard & Ross (2012) and the larvae with Wallace, Wallace & Philipson (2003). Voucher specimens will be deposited in the National Museum of Ireland, Dublin.

Tinodes maculicornis (Pictet) (Psychomyiidae)

Carlow: small river near St Mullins (Irish grid reference S7238), 1♂ 5.vii.2014, swept from river bank vegetation, JPOC/MAOC, det. JPOC. **Wexford:** R. Barrow (S7330), near Ballyanne, 1♂ 5.vii.2014, flew on to boat, JPOC. *Tinodes maculicornis* is a gallery-building caddisfly which has not been found in Britain. O'Connor & O'Connor (2013) reported its discovery in south-east Ireland. Another adult has now been taken on the small river at St Mullins in Co. Carlow but well upstream of the original captures there. In 2013, one of the new records was from a cruise boat on the River Nore in Co. Kilkenny. At that time, a male flew on to the *Galley Cruising Restaurant* during an evening river trip when dinner was being served and was captured while scuttling about on the ceiling in the dining area, much to the amusement of the other diners. Extraordinarily, a similar event occurred nearly a year later on the same boat, again while dining. Another male flew on to the boat and also ran about on the ceiling. However, this time the vessel was on the River Barrow in Co. Wexford. The O'Connors have been taking evening cruises on this boat for nearly twenty years and except for the two specimens of *T. maculicornis* in 2013 and 2014 have never seen any other caddisflies aboard despite searching for them.

Limnephilus elegans Curtis (Limnephilidae) new to Northern Ireland

Antrim: Garry Bog (C9430) near Ballymoney, Heath portable light-trap 2♂♂ 1♀ 17.vi.2014, KGMB, det. JPOC. *Limnephilus elegans* is a rare Irish caddisfly and with its discovery in Co. Antrim, is now known only from nine Irish counties. Its Irish distribution is shown (Fig. 1). The habitat is raised bogs and the edges of some fens. The larvae have been found in small pools amongst *Sphagnum* and sedges (Wallace, 1991). Its discovery at Garry Bog is of significance as this is the largest area of lowland raised bog in Northern Ireland. It has been identified as an area of ecological importance by being designated as a National Nature Reserve (NNR), Ramsar Site, Special Area of Conservation (SAC) and as an Area of Special Scientific Interest (ASSI). The bog is also of international importance in the development of dendrochronology and the pioneering site of tephrochronology in Ireland. The latter involves the study of fine tephra which are dust fragments resulting from explosive volcanic activity (Anon, 2014).

Limnephilus luridus Curtis (Limnephilidae) new to Northern Ireland

Antrim: Garry Bog (C9430), Heath portable light-trap 1♂ 3♀♀ 17.vi. 2014, KGMB, det. JPOC. **Tyrone:** Aghaboy (H5581), Heath portable light-trap 1♂ 2♀♀ 14.vi.2014, KGMB, det. JPOC; Creggan (H6278), Heath portable light-trap 1♂ 14.vi.2014, KGMB, det. JPOC. *Limnephilus luridus* is a widely distributed Irish species (Fig. 2).

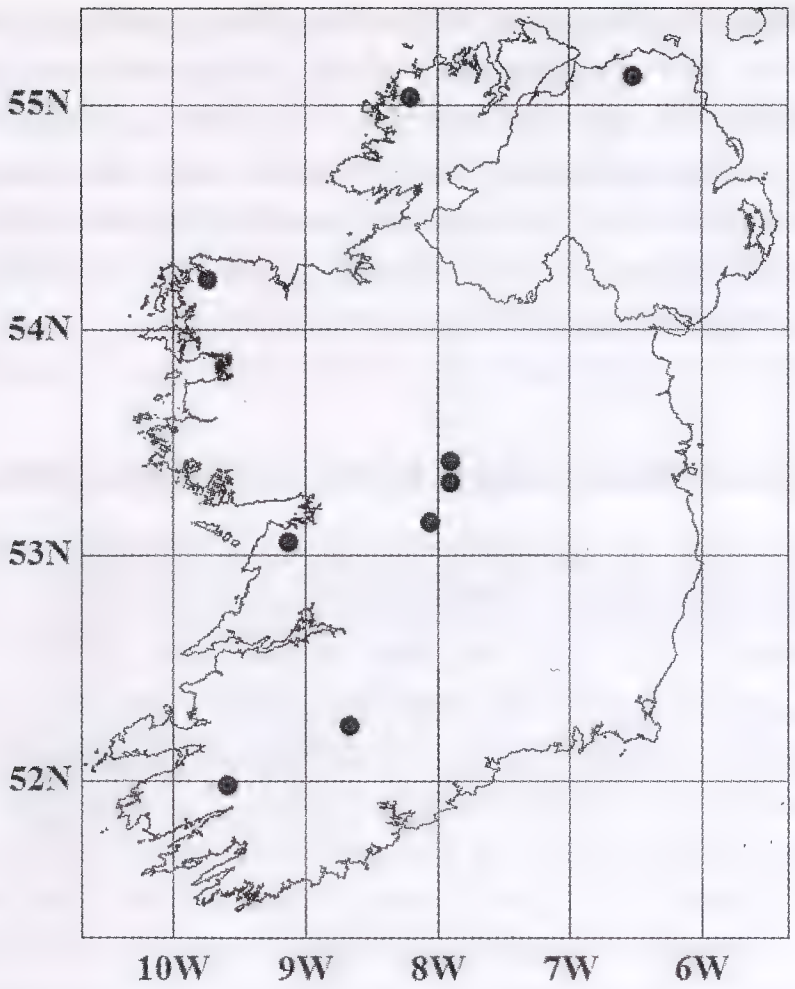


Fig. 1. The known Irish distribution of *Limnephilus elegans* (Curtis).

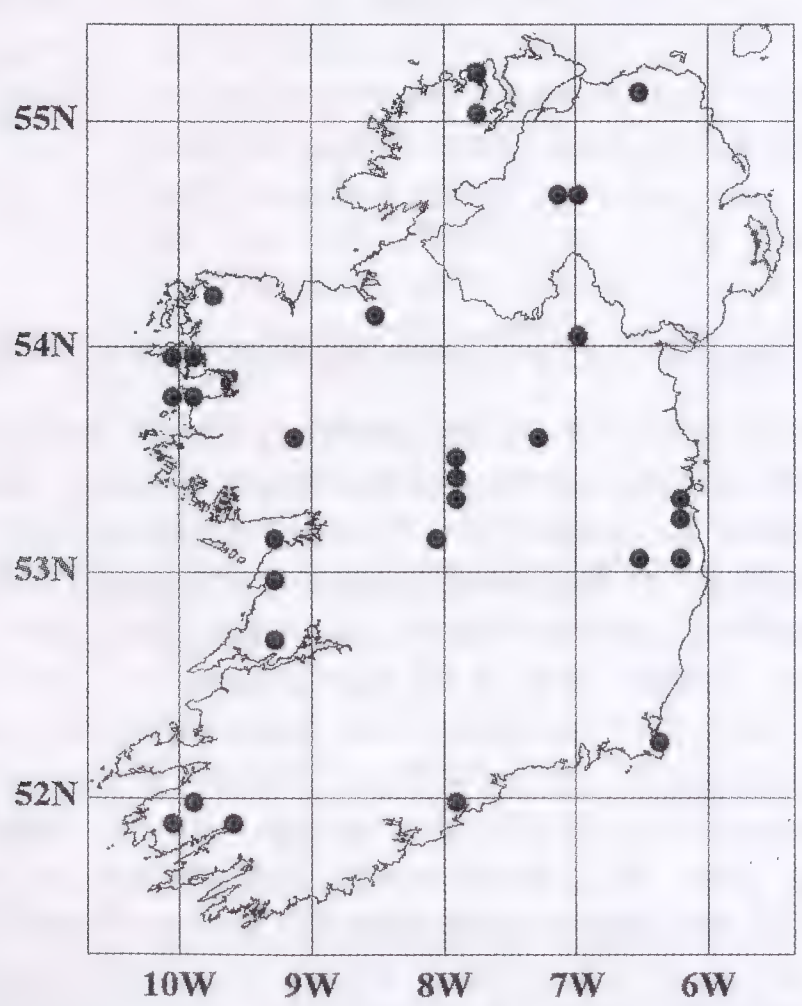


Fig. 2. The known Irish distribution of *Limnephilus luridus* (Curtis).

Potamophylax cingulatus (Stephens) (Limnephilidae) new to Northern Ireland

Down: Tollymore National Park (J3432), River Shimna, larva 22.vi.2014, MAOC, det. JPOC, (J3532), stream, 20 larvae under stones, 22.vi.2014, MAOC & JPOC, det. JPOC. *Potamophylax cingulatus* is a widely distributed Irish species (Fig. 3) but King did not collect it during his visit to Tollymore in 1912 (O'Connor & Hancock, 2014).

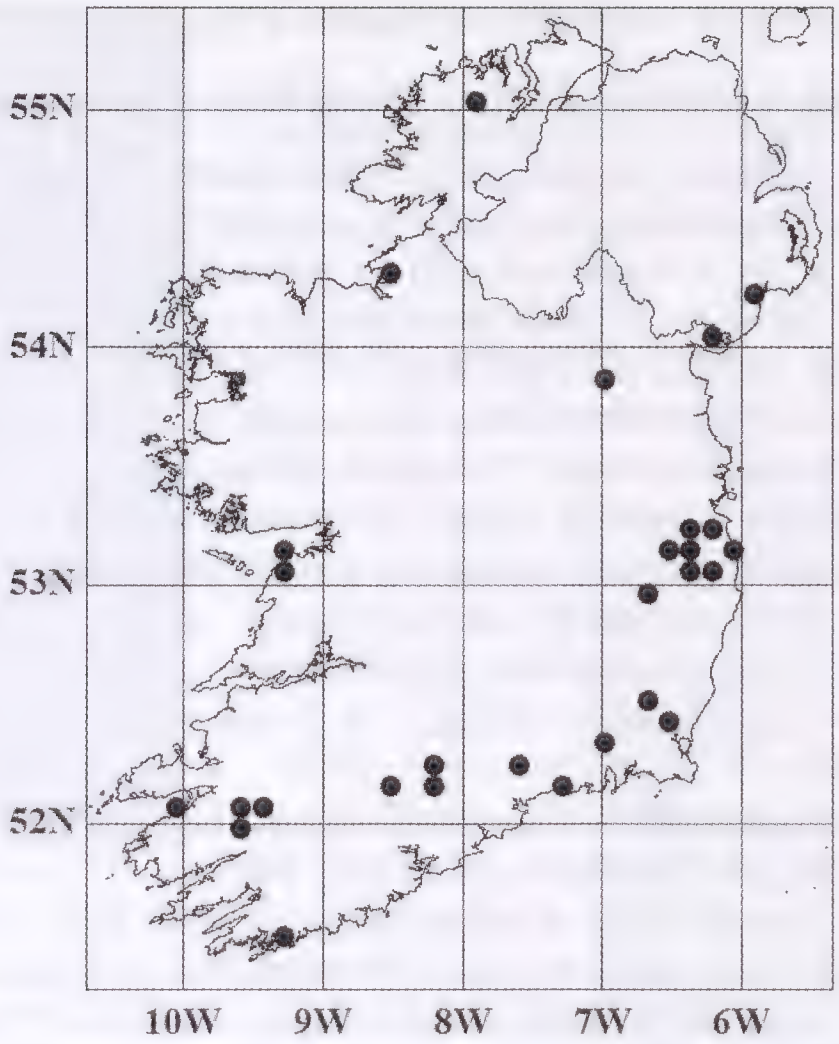


Fig. 3. The known Irish distributions of *Potamophylax cingulatus* (Stephens).

Although only larvae were taken at the Northern Ireland sites, many adults have been collected elsewhere on the island.

The O'Connors wish to thank Captain Dick Fletcher of the Galley Cruising Restaurant and the staff of the Tollymore National Park for facilitating the collection of caddisflies. Ken Bond wishes to thank Damian McFerran of the Ulster Folk and Transport Museum for supporting fieldwork in Northern Ireland. The maps were prepared using DMAP and the senior author is indebted to Alan Morton for providing a special programme for producing them. – J. P. O'Connor, Emeritus Entomologist, National Museum of Ireland, Kildare Street, Dublin 2, Ireland (email: joconnor@museum.ie), K. G. M. Bond, Department of Zoology and Animal Ecology, School of BEES, University College Cork, Distillery Fields, North Mall, Cork, Ireland (email k.bond@ucc.ie) & M. A. O'Connor, c/o National Museum of Ireland, Kildare Street, Dublin 2, Ireland.

References

Anon 2014. Garry Bog. http://www.ballymoney.gov.uk/bmbc_garry_bog_leaflet_05_11.pdf

Barnard, P. & Ross, E. 2012. The adult Trichoptera (caddisflies) of Britain and Ireland. *Handbooks for the Identification of British Insects* **1**(17): i–iv, 1–192.

O'Connor, J. P. & Hancock, E. G. 2014. Notes on Caddisflies (Trichoptera) collected by J. J. F. X. King in Co. Down including two species new to Northern Ireland. *Entomologist's Record and Journal of Variation* **126**: 110–113.

O'Connor, J. P. & O'Connor, M. 2013. *Hydroptila valesiaca* Schmid (Trich.: Hydroptilidae) new to Ireland with records of two other notable species. *Entomologist's Record & Journal of Variation* **125**: 189–193.

Wallace, I. D. 1991. *A review of the Trichoptera of Great Britain. Research & survey in nature conservation.* No. **32**. Nature Conservancy Council, Peterborough.

Wallace, I. D., Wallace, B. & Philipson, G. N. 2003. Keys to the case-bearing caddis larvae of Britain and Ireland. *Scientific Publications of the Freshwater Biological Association* **No. 61**: 1–259.

FIELD MEETING

Slab Common, Bordon, Hampshire, 8th June 2013

Leader: **Stephen Miles**. – Permission was obtained from the site owners, the Ministry of Defence, for this moth trapping evening meeting to take place. The area chosen for the use of light traps was 200 to 300m west of the site's eastern edge in Mornington Road, Bordon. A large area of open grassland and wet heathland was used by Bill Wain to site his mv light within. Tony Dobson placed his small 6 watt Heath trap on the track just 100m from the eastern edge of the site. His mv light was placed further north and west near to scattered conifers, gorse, broom and heather patches. The leader had hoped to place his 40 watt actinic light farther to the west but unfortunately on completion of setting it out, the inverter failed.

The area comprises heathland with occasional deciduous trees and with more extensive patches of coniferous woodland and scrub and is also a local Site of Interest to Nature Conservation (SINC). It is currently an Army tracked-vehicle recovery training site.

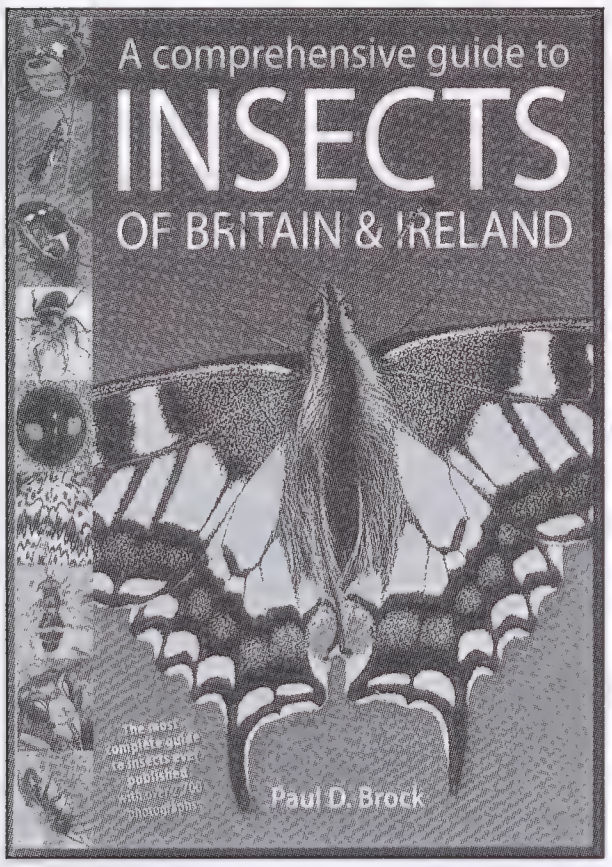
The meeting was organised as a joint meeting of the Alton Natural History Society (ANHS) and the British Entomological and Natural History Society (BENHS). However the leader was the only member of the ANHS to attend. Of the three other persons present, Bill Wain was a member of the local ecological conservation group, Jim Smith was a local birdwatcher and Tony Dobson represented the British Entomological & Natural History Society. The purpose was for moth recording and general natural history observation to obtain more site information for the Local Biodiversity Action Plan (LBAP). This LBAP is updated annually with the results from these meetings. Fortunately, once again, it was a dry and pleasant evening. Tony recorded the temperature at the start of the evening's trapping as 13° C dropping to 12° C at 1.00h. All participants finally left the site by 1.30h.

In all 38 species of moths were recorded which was not particularly good but reflected perhaps the coldness of the night and the difficulties of this part of the site, which has lots of bare sand devoid of any vegetation because of the type of military training conducted here, but interspersed with "heather" and scrub areas. Tony Dobson confirmed the identity of the only Notable species taken on the night, the Broom-tip moth, *Chesias rufata rufata* (F.), with one individual at each mv trap. Broom itself remains very frequent in occurrence at this site and the leader suspects that this site was the one named in Barry Goater's original edition of his book, "The Butterflies and Moths of Hampshire and the Isle of Wight", as occurring at Oakhanger, which is actually just a mile to the west of this site.

Other interesting species observed and recorded by Tony Dobson were: Triple-spotted Pug, *Eupithecia trisignaria* H-S, though some experts doubt this record as it has never been recorded in this area in the past, so perhaps this record should be treated with some caution; Cream Wave, *Scopula floslactata* (Haworth) identified by Tony at Bill Wain's mv; one Poplar Lutestring, *Tethea or* (D. & S.) reflecting the fact that poplar trees have been planted as a screen on the site and finally Fox moth, *Macrothylacia rubi* (L.) which was present in all three traps.

Jim Smith heard the churring of a nightjar coming from nearby, a ground-nesting migrant bird that is frequently found here.

Once again our thanks go to the Chairman of the Longmoor Conservation Group, representing the Defence Infrastructure Organisation for permission to hold the meeting.



BOOK REVIEWS

A comprehensive guide to insects of Britain & Ireland by Paul Brock. (Pisces Publications, 2014). 524pp. Softback £28.95. ISBN 978-1-974357-58-2.

This new field guide to British insects is stated to be the most comprehensive ever and with more than 1,200 species described and illustrated with high definition colour photographs, this is most certainly true. The guide literally begins with the inside covers: the front has photographs of representative species of each order to help the user identify the main types of insect and the inside back covers provide a glossary of technical terms.

Each insect order is described in turn, based on modern phylogeny, so that sadly, the entognathans: Collembola (springtails), Diplura (two-tailed springtails) and Protura (proturans), formerly accepted as honorary insects are excluded. There is however a single photograph of a springtail, the largest and numerically most profuse group included for comparison. The pages of each order are colour-coded at the top so that with a bit of practice you can easily find the right section of the book to drill down into: Phasmida (Phasmatodea, stick insects), the author's favourite group are coloured green, whereas the Lepidoptera are coded brown, obviously for little brown jobs. Each double page spread has text on the left with up to 15 colour photographs of species covered in the text on the right. Most, but not all species on an individual plate are shown relative to size and smaller insects are necessarily enlarged to show the characteristic outline and main features of the species. These work remarkably well, though it should be remembered that many of the smaller species portrayed such as the leafhopper *Eupteryx aurata* cannot be identified with certainty from photographs alone and should be taken as representative of their group. The text also contains numerous colour photographs of habitats where described species are likely to occur and the occasional photo to help with species identification. The author has also miraculously managed to find space to include thumbnail-sized distribution maps of species, up to 12 on a page, and these are a real bonus. The guide is truly packed with useful information.

I am less happy over the use of common names on the plates, as this is where the reader's eyes will tend to focus first. Many of the names are not in common parlance among entomologists and this could be confusing for a novice trying to explain which insects he or she has found. Take the above example, *E. aurata*, referred to as the potato leafhopper. Most entomologists throughout the world would presume this refers to *Empoasca fabae*, a major pest of potatoes (Anderson, 1975) whereas *E. aurata* occurs in low numbers occasionally on potato in the UK along with *E. atropunctata* and for completeness has acquired the same common name (Thomas, Janson & Aitken, 1968). Some plates even have a mix of English and proper species names. However it is apparent that this guide is intended to be used by naturalists with a very wide range of expertise, and for some, English names are entirely appropriate. Common names can be very useful when discussing species of conservation concern and ideal when talking to the press.

The real strength of the guide is, of course, the inclusion of a massive number of species portraits, in colour, many new, in one quite small book. There are

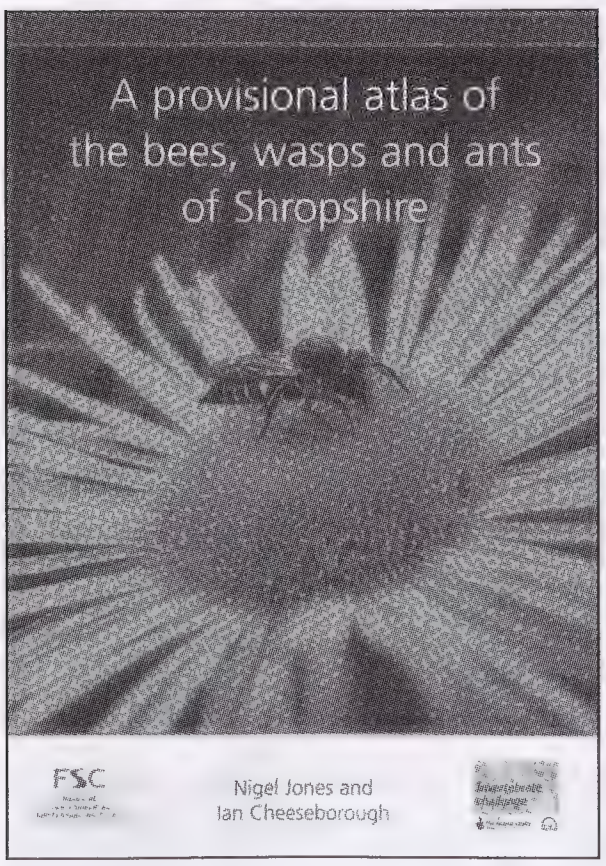
photographs of a significant number of species I have read about, often as lengthy descriptions but never seen - so I have already benefited from dipping into the book. Photographs are a very easy way to acquire entomological knowledge. The guide has durable soft covers and is designed to fits easily into a jacket pocket or rucksack Every UK entomologist should own a copy : I do.

JOHN BADMIN

REFERENCES

Anderson, D. M. 1975. *Common names of Insects*. Entomological Society of America Special Publication 75–1. 36pp. ESA.

Thomas, I., Janson, H. W. & Aitken, A. D. 1968. *Common names of British insects and other pests*. MAFF Technical Bulletin No. 6. 72pp. HMSO.



A provisional atlas of the bees, wasps and ants of Shropshire by Nigel Jones and Ian Cheeseborough. (Field Studies Council, 2014). 120pp. Softback £11.20 plus £2.00 p&p. ISBN 978-1-908819161.

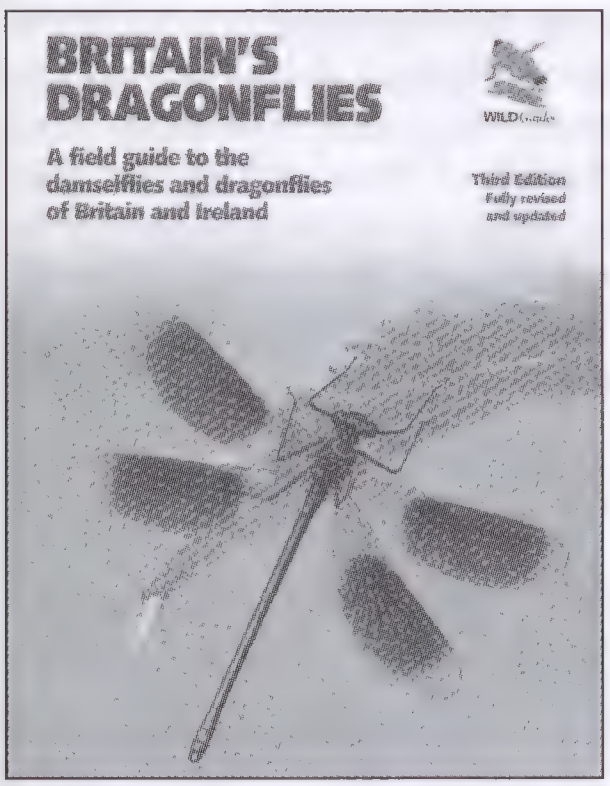
This sumptuously produced book is the first modern account of the status of the county's aculeate fauna and the first to include tetrad distribution maps. Introductory chapters describe the history of entomology and aculeate recording in the county and the methods used in the current survey. Although several eminent local entomologists were collecting Lepidoptera, flies and beetles a long time ago there were no early pioneer hymenopterists until relatively recently. The earliest record of an aculeate itself is to be found in the Caradoc and Severn Valley Field Club publication of 1899 where it refers to a *Vespula* species, which in the absence of any specimens may or may not have been *V. vulgaris*! The first fully confirmed record is of the slave ant *Formica sanguinea* found in the Shropshire part of Wyre Forest in 1900 by an almost anonymous entomologist tantalisingly known as 'JWS' according to the museum data label. A trickle of records followed over the intervening years but virtually no systematic recording of Hymenoptera was undertaken in the county until John Wattison and Llewelyn LLoyd made a determined effort to collect in 1941. Their published list of 42 species, of which 37 were new to the county included some noteworthy species. Chief among these were the bumblebees *Bombus humulis*, *B. ruderatus*, and *B. soroeensis*, the anthophorid *Nomada hirtipes* and *Andrena trimmerana* and *Lasioglossum nitidiusculum* indicating the county should be relatively rich in species. Further recording was undertaken by contemporaries, but it was not until the 1970s that a mix of resident and visiting entomologists began a more thorough survey of the region. By the 1990s, the atlas database showed there were at least 36 recorders and visits by entomologists from nearby World Museum Liverpool was an added bonus.

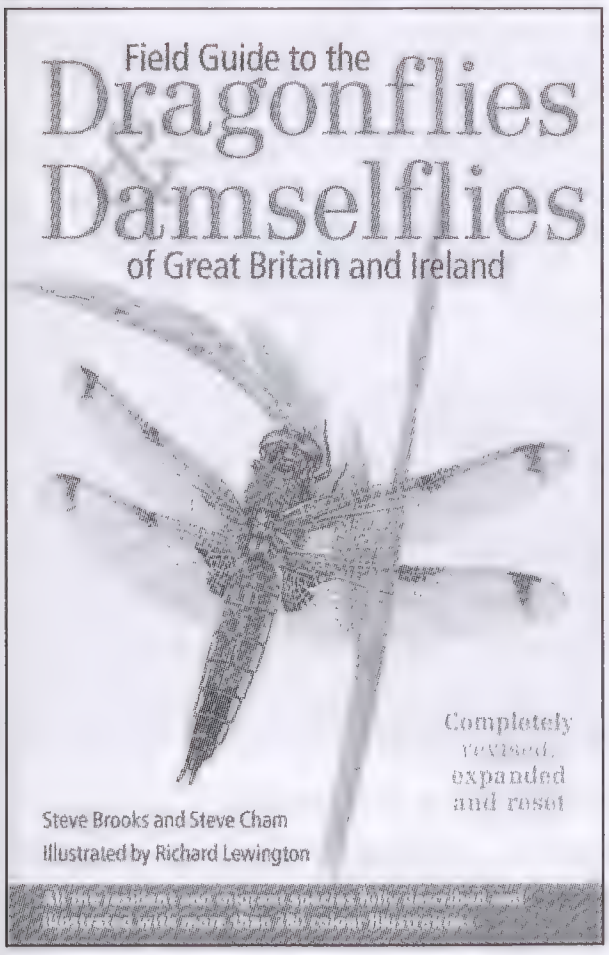
The 314 taxa accounts, based on approximately 14000 records, cover the period 1899–2014. Despite the best efforts of the authors, who have contributed a major proportion of the records, an appreciable number of tetrads remain to be investigated. Even so it is probable that the maps, incomplete though they are, provide a fair illustration of each species distribution and status within the county.

All the information a hymenopterist would wish to know about the county's fauna can be found in this one book: a checklist of species with first recorder's name and date; important and potentially new Shropshire species, species accounts and maps, key sites, a gazetteer of localities mentioned in the text and an index to species. The book finishes with 24 colour figures of selected species.

This is a superior publication in all respects that has benefited from having strong links with the Field Studies Council in Shrewsbury who helped design and publish the book.

JOHN BADMIN


BRITAIN'S DRAGONFLIES
A field guide to the damselflies and dragonflies of Britain and Ireland
Third Edition
Fully revised and updated



Britain's Dragonflies : A field guide to the damselflies and dragonflies of Britain and Ireland by David Smallshire and Andy Swash. Third edition. (Princeton University Press, USA, 2014). 224pp. Softback £17.95. ISBN 978-0-691161235.

Dragonflies & Damselflies of Great Britain and Ireland by Steve Brooks & Steve Cham. Second edition. (British Wildlife Publishing, UK, 2014). 192pp. Softback £15.95. ISBN 978-0956490285.

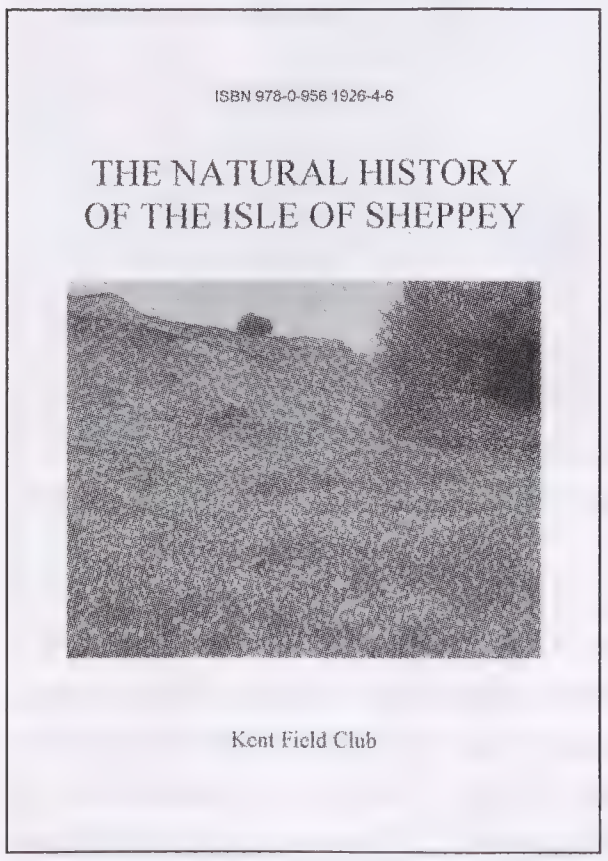
It is splendid news to learn that British entomologists have the luxury of having two revised, fully-comprehensive field guides on Odonata published in the same year. Each book has been highly successful in the past and it is the fact that new species have arrived and established themselves in the UK over the past few years coupled with a greater understanding of odonate biology and distribution that has driven the need to publish updated accounts.

The first to be republished, by David Smallshire and Andy Swash, has over 450 colour photographs and 550 illustrations showing adult males and females, immatures and all colour forms. Chapters cover Dragonfly Biology, Where to look for Dragonflies, Watching and photographing Dragonflies, How to identify species, followed by the main section (107pp) of Species Accounts. Each species is covered in a 2-page spread, with descriptive text, illustrations of key taxonomic features (i.e. close-ups of head, thoracic and abdominal segmental patterns, a relatively large distribution map and three boxes covering Look-Alikes, Where to Look and Observational Tips on the left-hand side. The opposite page is devoted to colour photographs of the adult insect in typical pose. Some of the species accounts seemed to me to be almost too colourful and in-your-face whereas others achieve a better balance. The information was of sufficient quality that I could easily identify a Norfolk Hawker *Aeshna isosceles* from a photograph taken in Blean Woods, Kent in 2014, well outside the species normal range in Norfolk. There are also pictorial keys to nymphs and details of legislation relating to the British odonate fauna.

The revised guide written by Steve Brooks and Steve Cham covers essentially similar territory with information and illustrations of newly arrived species, revised distribution maps and more information in species accounts. The guide differs from Smallshire & Swash in using detailed colour illustrations of species painted by Richard Lewington and colour photographs take a secondary role. This does mean that key identification features can be highlighted in a more definitive way. Such features can show a degree of variation and these are adequately covered with extra descriptions given in the text.

It is amusing to note that publication of both books nicely conforms to Badmin's Law (1975), which states that the number of taxonomic books on a given taxa group is inversely related to the number of species in that group. Both books are fully comprehensive, a delight to use and should be on your bookshelf. Both refer to the British Dragonfly Society as the principal body overseeing the study, recording, and conservation and educational effort focussed on dragonflies in Britain. This is a role our very own Society once proudly held and now the same process of splitting by other taxa groups is underway: a great shame. Personally I hope this can be avoided, but I do not hold out much hope.

JOHN BADMIN



The Natural History of the Isle of Sheppey edited by John Badmin. 272pp. Transactions of the Kent Field Club Volume 18. Softback £12.00 p&p £2.00, available via the website www.kentfieldclub.org.uk. ISBN 978-0-956 1926-4-6.

This is the first book to be published about the wildlife of Sheppey, a medium-sized island situated just off the north coast of Kent. Despite boasting two National Nature Reserves, fine coastal stretches of sand and shingle and tumbling cliffs famous for its fossils, the island (technically three) remains relatively under-recorded biologically compared with the south-east in general. We learn that Thomas Johnson, a London apothecary, was the first botanist to visit, in 1629, but that he and his colleagues were promptly arrested as 'foreigners', imprisoned in the now lost Queenborough Castle, only to be released and later entertained by the local mayor, once it was known they were 'men of science and medicine'. Their time was not entirely wasted as they compiled a reasonable list of plant species from the castle's ramparts. Robert Plot, first Keeper of the Ashmolean Museum, Oxford, made several visits between 1689 and 1692. Johann Dillenius was the next important botanist to visit Sheppey in the early 1720s and among the many specimens collected he described several seaweeds new to science from the surrounding waters. Entomologists were seemingly less adventurous, and although brief visits were made it was not until Walker's 1931 classic publication that the richness of the island's insect fauna was widely recognised.

The geology and landscape of Sheppey is reviewed by Chris Young and it is interesting to learn that the island would have stretched a further 7 kilometres north in early postglacial times when sea levels were much lower. Today the cliffs erode into the sea at a rate of 1–5m per year and EU funding is used to shore up key areas to protect nearby housing.

Subjects covered include: The vascular plant of Sheppey, Birds on Sheppey – 50 years of change, the islands mammals, marine algae (seaweeds) and the native and non-native marine fauna of natural and man-made habitats around Sheppey. Entomological subjects include: A provisional atlas of the Orthoptera (Richard Moyse), Aquatic Coleoptera (Ron Carr) and Sheppey's moths (David Gardner). Entomologically, the island is best known for being the last locality in Britain where the Essex Emerald moth *Thetidea smaragdaria* occurred and the presence of the Pride of Kent rove beetle *Emus hirtus*, Dainty Damselfly *Coenagrion scitulum* and now an RDB1 moth.

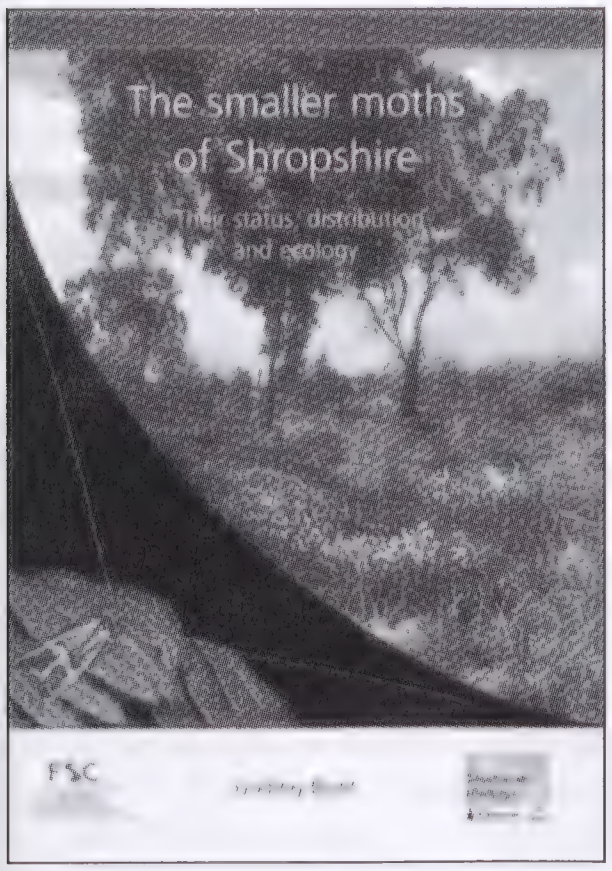
The flora and fauna of the soft cliffs are described in detail for the first time by John Badmin who highlights the need for more study in the area. Many stretches of cliff are covered by the rare pea *Tetragonolobus maritimus* and yet no insect species specifically associated with this plant have come to light. Sheppey's extensive saltmarshes are reviewed by the same author. Many insect RDB species including two new to Britain have been recorded from the Isles of Harty and Elmley, several of which result from BENHS meetings held there. Population data for the Ground Lackey moth *Malacosoma castrensis* from both sides of the Swale show how important the whole area is, literally acting as a huge corridor for this and other saltmarsh invertebrates.

The book concludes with a mainly pictorial account on the future challenges for Sheppey's wildlife by John Stanford, a recent mayor of the island.

JOHN STEWART

REFERENCE

Walker, J. J. 1931. An annotated list of the Coleoptera of the Isle of Sheppey. *Transactions of the Entomological Society of the south of England* **7**: 81–140.



The smaller moths of Shropshire by Godfrey Blunt. (Field Studies Council, 2014). 172 pp. Softback £15.00 plus £2.00 p&p. ISBN 978-1-908819-21-5.

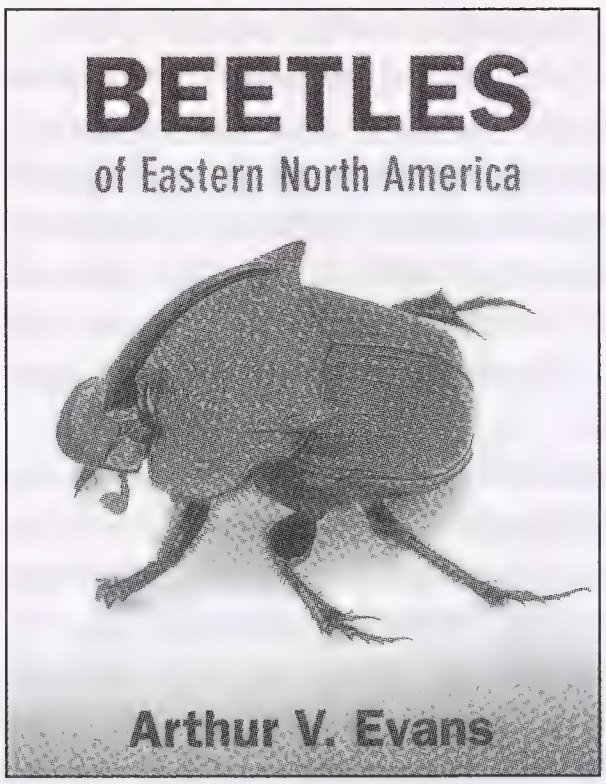
Based on approximately 18,500 records covering over 800 species, this is the first ever published atlas of the smaller moths (Microlepidoptera) of Shropshire.

Located in west-central England on the border with Wales, Shropshire offers a wide diversity of habitats over an altitudinal range from below 100m to above 500m. Its topography produces climatic patterns that strongly influence moth distributions, and it stands at a crossroads where species of warm, dry lowland Britain meet those of the cool, wet uplands.

This book describes the status and distribution of the county's smaller moths and examines their relationships with climatic factors, habitat types and host plants. It explores evidence of long-distance migration and local and regional dispersal, and discusses the impact of habitat management on microlepidopteran populations.

This atlas is similar in format to the Provisional atlas of the bees, wasps and ants of Shropshire (Jones & Cheeseborough, 2014) described above and is beautifully produced.

JOHN BADMIN



Beetles of Eastern North America by Arthur V. Evans. Princeton University Press, 2014. 560pp, soft cover, $35 (£24.95), ISBN 978-0-691-13304.

Despite the availability of excellent monographs filled with careful keys to determine an identification, there is nothing to beat just flicking through a picture book until you find something that looks about right. For the beginner, working through a long dichotomous key to determine family or genus can be daunting in the extreme. And an expert can go straight to the genus or subgenus key, sometimes to one particular couplet, to remind themselves which of those two sister species it might be.

Just 'a picture book', though, does no justice to this fine tome. Alongside the photos of 1406 species are detailed descriptions of the beetles, family diagnoses, notes on biology and ecology, and a general introduction to the study of the Coleoptera. The fact that this book covers a fauna from a continent several thousand miles away should not put off the British entomologist. Certainly many of the species look exotic, but there runs a reassuring familiarity through so many of the genera and groups that occur across the northern hemisphere.

I was particularly struck by the tessellated magnificence of the mordellids, and the sculptured rugosity of some of the hispine chrysomelids; and of course the many families not represented in the British Isles, like the cycad weevils (Belidae), false longhorns (Stenotrachelidae), and the bizarrely named telephone-pole beetles (Micromalthidae).

Perhaps the greatest shock (or delight) was to have one of my personal beetle tenets profoundly shaken. Ever since I was a teenager I 'knew' that all beetles have only 11 antennal segments, unless one or two have been lost or fused somewhere deep in evolutionary history. But here is a picture of the tile-horned sawyer beetle, *Prionus imbricornis*, clearly showing its 20 antennomeres. Madness.

It is these tantalizing differences and snippets of unexpected scientific depth that have enthralled me. Somewhere I have a box of a few beetles I collected in Florida many years ago. I have already recognized some of them in the pages of the book. More work is required I think.

It took a few extra days to arrive from the USA, but less than £25 for a beetle book the size of a paving stone meant there was no way I was not going to buy it.

RICHARD JONES

THE MAITLAND EMMET BENHS RESEARCH FUND

In 2001 the family of the late Lt. Col. Maitland Emmet, a distinguished amateur microlepidopterist, made a generous donation to the Society's Research Fund in his memory. As a result the Society has renamed its Research Fund the Maitland Emmet BENHS Research Fund. The Society is very grateful to the Emmet family for their generosity.

The Society invites applications for grants, from the Maitland Emmet Research Fund, to be awarded in January 2016. Awards are open to both members and non-members of the BENHS and will be made to support research on non-marine arthropods, with reference to the British fauna, and with preference given to insects, arachnids, myriapods and isopods. Grants will be given for:

(a) the assistance of fieldwork on non-marine arthropods with relevance to their conservation,
(b) work leading to the production of identification guides and distribution lists, but not the cost of publishing such items.

Travel to examine museum collections and to consult taxonomic specialists would be included. The work and travel is not limited to the British Isles but must have a demonstrable relevance to the British arthropod fauna. Individual grants are unlikely to exceed £500.

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Cover photograph: 7-spot ladybird *Coccinnella septempunctata* L. searching for aphid prey on wheat, 2014. Photo: Victoria Wickens.

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A PISTACHIO PSYLLID *AGONOSCENA TARGIONII* (HEMIPTERA: APHALARIDAE) NEW TO BRITAIN

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ABSTRACT

A pistachio psyllid *Agononesca targionii* (Lichtenstein) (Hemiptera: Aphalaridae) is reported breeding indoors in Britain for the first time. It was detected on plantings of *Pistacia lentiscus* (L.) in the Mediterranean Biome of the Eden Project, Cornwall, England in April 2013. Although its origin and the introduction pathway are unknown, historic records suggest that it is likely to have been present for at least ten years. The biology, distribution, economic importance and control of *A. targionii* are reviewed.

INTRODUCTION

The warm temperate Mediterranean Biome of the Eden Project, Cornwall, England features plants typical of the Mediterranean, South Africa and California, with a temperature range of 9°C (winter) to 25°C (summer) (www.edenproject.com). Featured plantings include olive trees, proteas, vines, aromatic herbs, citrus fruits and *Bougainvillea*. In April 2013, several unfamiliar psyllid nymphs were detected on leaves of an individual Mastic Tree *Pistacia lentiscus* L. (Anacardiaceae) within the Mediterranean Biome. A subsequent visit in November 2013 revealed numerous adults and distinctive leaf-rolls on the same tree. Consultation of available literature led to a tentative identification of *Agononesca targionii* (Lichtenstein) – one of a number of *Pistacia*-feeding psyllids – with confirmation being provided by Daniel Burckhardt of Naturhistorisches Museum, Basel via examination of specimens (adults and nymphs). A further visit in April 2014 found the psyllid to be present in large numbers on additional *P. lentiscus* trees within the biome, notably visible due to the abundance of wax-coated nymphs. Although not identified or reported in the literature, the presence of a psyllid on *Pistacia* within the Mediterranean Biome had been noted by Eden Project workers at least ten years previously (K. Treseder, pers. comm. Dec. 2013), and it is therefore likely that the species arrived when many mature plants were imported in time for the attraction's first public opening in 2001.

This is the first known incursion of *A. targionii* in Britain. Its description, biology, distribution, economic importance and control are reviewed herein.

SPECIES DESCRIPTION AND BIOLOGY

Agonoscena targionii is described and illustrated in detail in Burckhardt & Lauterer (1989). Adults are 3–4 mm in length (Plate 1, Fig. 1). The head/thorax reddish-dark brown in colour and marked with pale spots and longitudinal lines, and the abdomen dark striped when mature, and paler in teneral individuals. The head is slightly rounded in appearance, and genal cones are absent. Antennae are c.0.5 mm in length, pale in colour but with dark apices to the fourth, sixth and eighth segments, and the ninth and tenth segments entirely dark. Legs are pale in colour. Forewings are off-white in colour, with dark 'spotted' or banded venation, and a dark zig-zag pattern around the outer margin. Hindwings are pale in colour. Terminalia are light brown in colour. Images of individuals found are provided.

Final instar nymphs are c.1 mm in length, earlier instars, smaller. There is some variation in overall shape, with some individuals appearing short and stout and other individuals appearing elongate. Early instars are pale in colour with a small amount of sclerotisation. Later instars are pale or darker brown with varying degrees of sclerotisation with wing buds dark in colour with marginal setae (Plate 1, Figs 2 & 3). In all instars, antennae consist of seven segments. Nymphs produce and are sometimes covered in filamentous waxy secretions. Slide-mounted specimens have been retained at the Naturhistorisches Museum, Basel and images of individuals found are provided.

Agonoscena targionii is one of seven psyllid species known to feed on *Pistacia* spp., the others being *A. bimaculata* Mathur, *A. cisti* (Puton), *A. cyphonopistae* Li, *A. pistaciae* Burckhardt & Lauterer, *Megagonoscena gallicola* Burckhardt & Lauterer and *M. viridis* (Baeva), (Puton, 1882; Baeva, 1963; Mathur, 1973; Burckhardt & Lauterer, 1989; Li, 1994).

There is little detail in the available literature regarding the biology of *A. targionii*. Lichtenstein (1874) writes that the nymphs feed on *P. lentiscus*, creating rolls on the outer edge of the terminal leaves, and that adults emerge in November (Plate 1, Fig. 4). Saour (2005) writes that eggs are laid mid-April; however, within the Mediterranean Biome of the Eden Project, eggs were found inside leaf rolls during November. At this time both adults and nymphs were also observed feeding on all parts of the leaves, although in relatively small numbers. In April, adults and wax-covered nymphs were found feeding in abundance, and again, eggs (only) were found inside leaf rolls (Plate 1, Fig. 5). Leaf growth was noticeably negatively affected by both adult and nymphal feeding, with leaf drop and loss of fruit buds evident, as well as leaf distortion, typical of extensive feeding (Lababidi & Zebitz, 1995). Also present on the leaves and stems was a significant level of unsightly sooty mould growth, indicative of honeydew secretion by both adults and nymphs (Saour, 2005).

Host range

The principal host plant of *A. targionii* is *Pistacia lentiscus* (Lichtenstein, 1874; Low 1888; Burckhardt & Lauterer, 1989); however, *P. terebinthus* (Travaset, 1994; Seljak, 2006) and *P. vera* (Lababidi, 2002; Saour, 2005) are also noted as hosts, whilst Hodkinson (2009) lists only the genus *Pistacia*.

The native range of *P. lentiscus* is predominantly Mediterranean, including Macaronesia, Northern Africa, Western Asia, Southeastern and Southwestern Europe (USDA, 2012). Important as an economic crop, it is cultivated for its resin and also as a food ingredient/food preservative, as well as for its medicinal properties (USDA, ARS, 2012). Its major centre of production is the Greek island of Chios, where it is granted European Union 'Protected designation of origin' (PDO) (Chios Mastiha Growers Association, 2014).

Pistacia vera is an economically important plant native to Western Asia and Middle Asia (USDA, ARS, 2012); it is widely cultivated for its seeds, which are popularly consumed as food (Pistachio nuts) (FAO, 2014). *Pistacia terebinthus* is native to the Arabian Peninsula and Western Asia (USDA, ARS, 2012), where it is used in cooking, medicine and as a source of turpentine (Giner-Larza *et al.*, 2002).

Geographical distribution

First described from Montpelier in southern France (Lichtenstein, 1874), *A. targionii* is widely distributed within the Mediterranean Basin area of the Palaearctic ecozone, being recorded as present in the following countries: Algeria, Azores, Balearic Islands, Corsica, Croatia (as Yugoslavia), France,

Greece, Israel, Italy, Morocco, Portugal, Slovenia (as Yugoslavia), Spain, St. Helena (Afro-Tropical), Tajkistan, Tunisia, Turkey (Lichtenstein, 1874; Löw, 1888; Horváth, 1892; Hodkinson & Hollis, 1981; Halperin *et al.,* 1982; Lodos & Onugar, 1985; Burckhardt & Lauterer, 1989 (and references therein); Seljak, 2006)

Route of entry

The presence of a psyllid on *Pistacia lentiscus* plants within the Mediterranean Biome was originally noted approximately ten years previously (K. Treseder, pers. comm. Dec. 2013). It is therefore considered most likely that the species arrived when many mature plants were imported from Europe in time for the attraction's first public opening in 2001.

Economic importance and control

In countries where there is significant *Pistacia* cultivation, both *A. targionii* and *A. pistaciae* are considered important economic pests. This is the case particularly with regard to *P. vera*, in that the psyllids' presence leads to a reduction in the potential number of viable seeds produced, and subsequently to significant yield losses (Traveset, 1994; Lababidi & Zebitz, 1995; Mart *et al.*, 1995; Lababidi, 2002; Saour, 2005; Hassani *et al.*, 2009). Since the 1990s there has been a notable increase in pistachio culture worldwide (Saour, 2005). Similarly, an increase in the impact of *A. targionii* on pistachio production has been observed since this time (Traveset, 1994; Lababidi, 2002). This has been attributed to a number of factors, including an excessive use of pesticides negatively affecting the psyllid's natural enemies (Lababidi, 2002). Research has been undertaken to investigate the efficacy of alternative methods of biological control on both *A. targionii* and *A. pistaciae* (the latter reviewed in Mehrnejad (2010)), including the parasitoid wasp *Psyllaephagus pistaciae* (Ferrière) (Mehrnejad, 2001; Mehrnejad & Copland, 2006), kaolin particle film (Saour, 2005) and coloured sticky-traps (Lababidi, 1997).

The presence of *A. targionii* in Britain is currently not considered to be of economic importance.

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References

Baeva, V. G. 1963. Novye vidy listobloshek (Homoptera, Psylloidea) iz Tadzhikistana. *Doklady Akademii nauk Tadzhikistoi SSR* **6**(31): 31–35. [not seen]

Burckhardt, D. & Lauterer, P. 1989. Systematics and biology of the Rhinocolinae (Homoptera: Psylloidea) *Journal of Natural History* **23**: 643.

Chios Mastiha Growers Association Chios – 16/09/14 Mastiha, a PDO product [online] at: http://www.gummastic.gr/index.php?contentid=234&langflag=_en [accessed 20 November 2014]

Eden Project – Mediterranean Biome [online] at: http://www.edenproject.com/visit-us/whats-here/mediterranean-biome [accessed 20 November 2014]

FAO (2014) FAOSTAT – Pistachios [online] at: http://faostat3.fao.org/search/pistacia/E [accessed 20 November 2014].

Giner-Larza, E. M., Máñez, S., Giner, R. M., Recio, M. C., Prieto, J. M., Cerdá-Nicolás, M. & Ríos, J. L. 2002. Anti-Inflammatory triterpenes from *Pistacia terebinthus* galls *Pharmacology* **68**: 311–315.

Halperin, J., Hodkinson, I. D., Russell, L. M., & Berlinger, M. J. 1982. A contribution to the knowledge of the psyllids of Israel (Homoptera: Psylloidea). *Israel Journal of Entomology* **16**: 27–44.

Hassani, M. R., Nouri-Ganbalani, G., Izadi, H., Shojai, M. & Basirat, M. (2009) Economic injury level of the psyllid, *Agonoscena pistaciae*, on pistachio, *Pistachio vera* cv. Ohadi. *Journal of Insect Science* **9**: Article 40.

Hodkinson, I. D. 2009. Life cycle variation and adaptation in jumping plant lice (Insecta: Hemiptera: Psylloidea): a global synthesis. *Journal of Natural History* **43**: 65–179.

Hodkinson, I. D. & Hollis, D. 1981. The psyllids (Homoptera: Psylloidea) of Mallorca. *Entomologica Scandinavica* **12**: 65–77.

Horváth, G. 1892. Chasses hivernales dans le midi de la France. *Revue d' Entomologie* **11**: 128–140.

Lababidi, M. S. & Zebitz, C. P. 1995. Preliminary study on the pistachio psyllid (*Agonoscena targionii*) (Licht) (Psyllidae: Homoptera) and its associated natural enemies in some regions of Syria. *Arab Journal of Plant Protection* **13**: 62–68.

Lababidi, M. S. 1997. An environment-friendly technology for pistachio psyllid control in Syria. *Arab Journal of Plant Protection* **15**: 57–63.

Lababidi, M. S. 2002. Effects of Neem Azal T/S and other insecticides against the pistachio psyllid *Agonoscena targionii* (Licht.) (Homoptera, Psyllidae) under field conditions in Syria. *Journal of Pest Science* **75**: 84–88.

Lichtenstein, J. 1874. *Psylla* (*Aphalara*) *Targionii. Bulletin de la Société Entomologique de France* **1874**: 228.

Lodos, N. & Onugar, A. 1985. Tiirkiye'de bulunan *Agonoscena* Enderl. cinsine bagali tiirlerin yeniden gözden geçirilmesi (Homoptera: Psylloidea: Aphalaridae). *Tiirkiye Bitki Koruma Dergesi* **9**: 231–238.

Löw, F. 1888. Uebersicht der Psylliden von Oesterreich-Ungarn mit Einschluss von Bosnien und der Herzegowina, nebst Beschreibung neuer Arten *Verhandlungen der Zoologisch-botanischen Gesellschaft in Wien* **38**: 5–40.

Mart, C., Uygun, N., Altin, M., Erklic, L. & Bolu, H. 1995. Species and pest control methods in pistachio orchards of Turkey. *Acta Horticulturae* (*Pistachio Nut*) **419**: 379–385.

Mathur, R. N. 1973. On a collection of Psyllidae (Homoptera) from the Indian subregion with descriptions of three new species. *Oriental Insects* **7**: 515–562.

Mehrnejad, M. R. 2001. The current status of pistachio pests in Iran. In: Ak, B.E. (ed.). XI GREMPA Seminar on Pistachios and Almonds. Zaragoza: CIHEAM, 2001. *Cahiers Options Méditerranéennes* **56**: 315–322.

Mehrnejad, M. R. 2010. Potential biological control agents of the Common Pistachio Psylla, *Agonoscena pistaciae*, a review. *Entomofauna* **31**: 317–340.

Mehrnejad, M. R. & Copland, M. J. W. 2006. Host-stage selection and oviposition behaviour of *Psyllaephagus pistaciae*, parasitoid of the common pistachio psylla *Agonoscena pistaciae*. *Biological Control* **36**: 139–146.

Puton, A. 1882. Description d'une espèce nouvelle de psyllides. *Revue d' Entomologie* **1**: 183–184.

Saour, G. 2005 Efficacy of kaolin particle film and selected synthetic insecticides against pistachio psyllid *Agonoscena targionii* (Homoptera: Psyllidae) infestation. *Crop Protection* 24: 711–717.

Seljak G. 2006. An overview of the current knowledge of jumping plant-lice of Slovenia (Hemiptera: Psylloidea). *Acta Entomologica Slovenica* **14**: 11–34.

Traveset, A. 1994. The effect of *Agonoscena targionii* (Licht.) (Homoptera: Psylloidea) on seed production by *Pistacia terebinthus* L. *Oecologia* **98**: 72–75.

USDA, ARS (2012) National Genetic Resources Program. Germplasm Resources Information Network – (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?28647 [accessed 21 November 2014].

THE HETEROPTERA ASSEMBLAGES OF AN OLD-FIELD SUCCESSION IN SOUTHERN ENGLAND

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ABSTRACT

Investigations of Heteroptera assemblages of old-field succession are normally undertaken using a series of different sites of known age; here, an analysis of the assemblages of the same old-field sites sampled over different years, in a proper time sequence is presented. The Heteroptera, which are generally associated with plants, show successional trends in assemblage composition, host-plant use and specialisation, with generalist feeders such as *Lygus rugulipennis* Poppius abundant in early ex-arable vegetation, *Stenodema laevigata* (L.), *S. calcarata* (Fallén) and *Ischnodemus sabuleti* (Fallén) which are restricted to grasses becoming more important as succession proceeds and the wooded sites becoming dominated by specialist herbivores, notably *Kleidocerys resedae* (Panzer) and *Elasmostethus interstinctus* (L.) on birch. A comparison with multi-site studies where between site differences may have distorted the results is briefly discussed, and the trends shown by the Heteroptera are compared to a similar successional study of phytophagous Coleoptera.

INTRODUCTION

The Heteroptera occur in every terrestrial and freshwater habitat in Britain, are very varied in their ecology (Kirby, 1992) and can be extremely abundant (Hollier, 2006). Most are herbivores, feeding especially on the ripening fruits and seeds of their host-plants, though many supplement their diet by feeding on invertebrates as well. They show a range of host plant specificity from extreme generalism to strict stenophagy

The British fauna is comparatively well studied, and some ecological information was already available for nearly all species by the time Southwood & Leston's *Land and water bugs* was published in 1959. In the subsequent 55 years much more information has been acquired, and the Heteroptera have been recognised as a particularly useful group for ecological studies (Kirby, 1992).

The relationship between Heteroptera assemblages and the vegetation is complex, depending on the plant species present but also on the architectural and structural complexity of the vegetation (Southwood, Brown & Reader, 1979). This in turn depends on site history and management, so the Heteroptera can be a useful indicator group for land use and conservation management (Mortimer, Hollier & Brown, 1998). Studies of successional trends in Heteroptera assemblages have been based on relatively short-term studies, on a comparison of different sites of known successional age, or on a combination of both of these approaches (Southwood, Brown & Reader, 1979). The present study uses data from a long-term study of plots taken out of arable cultivation, allowing investigation of the earlier changes in assemblage composition without the issues of management or site differences which complicate site comparison studies, and allowing an assessment of these factors with respect to Southwood, Brown & Reader's ground-breaking 1979 study.

Methods

A long-term study of secondary succession was carried out at Silwood Park, Berkshire, UK, from 1977 to 1998. In successive years areas of a fenced experimental field at Silwood Bottom (SU944688) were taken out of arable cultivation, ploughed and left to undergo old-field succession (for details of site preparation see Southwood, Brown & Reader 1979, for a sketch map of the experimental sites and woodland see Hollier & Belshaw, 1992). The experimental site created in 1977 became dense tussocky grassland in about ten years and was covered by scrubby oak woodland by 1998.

Other species included birch, hawthorn, and the odd, older, beech (left over from the parkland). The experimental sites were approximately 35m by 25m and subdivided into $9m^2$ sampling sub-plots. The vegetation was sampled with point quadrats with marked height intervals, providing information on the species composition and structure of the vegetation. Insect samples were collected using a D-vac suction apparatus, and the adult Heteroptera identified to species. The data were originally collected for a number of different projects, some of them incorporating other experimental factors; only data from control sub-plots from experimental studies are presented in this analysis. The number of samples varied from 30 to 45 D-vac sucks per site, with either four or five samples per growing season (May to September). More limited studies with lower sample sizes have been excluded. For this analysis species abundance data for the whole season have been summed, and the number of insects per m^2 of sampling effort used as the basis of comparison.

The old-field grassland used in Southwood, Brown & Reader (1979), which was an area disturbed during building work in 1971, is about 200m from Silwood Bottom and was sampled in the same way as the experimental sites. The woodland canopy insects were sampled using a beating bag in 1977 and 1978 in addition to D-vac sampling, and using Malaise traps in 1991 (see Hollier (2007) which discusses the differences in sampling using these different methodologies). The data were explored using reciprocal averaging (Henderson & Seaby, 2002), and information about the feeding guild, host-plant use and degree of host-specificity were taken from Southwood & Leston (1959).

Results and discussion

Altogether, 106 species of Heteroptera were recorded (the complete list is given in the appendix), and although most were found in low numbers, a few species were very abundant; *Ischnodemus sabuleti* (Fallén) in grassland sites and *Kleidocerys resedae* (Panzer) in the woodland both being represented by more than 1000 specimens. As the study was of relatively recent ex-arable habitats it is unsurprising that the species encountered were generally common and widely distributed. The only exception was the microphysid *Loricula coleoptrata* (Fallén) taken in the woodland and classified as Notable B by Kirby (1992).

As can be seen in Figure 1a, the sites form three distinct groups, with ex-arable sites (1–2 years old), grassland sites (4–11 years old) being separated from the woodland on the first axis, and from each other on the second. This may seem obvious, but serves to show that the schema used by Southwood, Brown & Reader (1979) reflects the reality of old-field succession. The assemblages associated with ex-arable vegetation feature generalist feeders such as the mirids *Lygus rugulipennis* Poppius and *Plagiognathus chrysanthemi* (Wolff). As succession proceeds through to

tussocky grassland, grass feeding species such as the mirids *Stenodema laevigata* (L.), *S. calcarata* (Fallén) and the lygaeid *Ischnodemus sabuleti* (Fallén) become the most important species in the assemblages. The woodland assemblages are dominated by specialist herbivores, notably the lygaeid *Kleidocerys resedae* (Panzer) and acanthosomatid *Elasmostethus interstinctus* (L.) on birch and *Psallus perrisi* (Mulsant & Rey) on hawthorn.

More interestingly, a clear and continuous successional trend from ex-arable to grassland can be seen if the woodland sites are excluded from the analysis (see Figure 1b, where age is highly correlated with scores on the first axis). The overall pattern shown here by the Heteroptera assemblages is very similar to that shown by the phytophagous Coleoptera assemblages from the same experimental sites (Brown & Hyman, 1986). Their results were explained in terms of host-plant colonisation and abundance but the Heteroptera include predators and so additional factors must be taken into consideration. The pattern shown in Figure 1b is also very similar to that for the Auchenorrhyncha (Hollier, Brown, & Edwards-Jones, 1994), which was explained in terms of vegetation structure as well as composition. Structure is important for the Heteroptera as is demonstrated by the abundance of *I. sabuleti* in the later grassland samples, which is clearly related to the formation of tussocks as well as the species of grass present (Hollier, 2006).

The inclusion of the grassland used by Southwood, Brown & Reader (1979) does not alter this pattern either with or without the woodland sites in the analysis, but it is notable that it appears 'younger' than it should in the analysis excluding the woodland. This almost certainly reflects the fact that, unlike the grassland used by Southwood, Brown and Reader (1979), the later experimental sites were fenced against rabbit grazing, which meant the swards became dominated by perennial grasses to a greater extent than grazed swards of the same age (Edwards & Crawley, 1999). Likewise, the fact that the second axis in Figure 1b separates younger sites is also probably an artefact of the experimental design, since each succession plot after the first had nearby ex-arable assemblages that could colonise the developing vegetation, while the initial plot had been colonised by more typical grassland species, a phenomenon also seen in the leafhopper assemblages (Hollier, Brown & Edwards-Jones, 1994).

Like the phytophagous Coleoptera assemblages in this succession (see Brown & Hyman, 1986), the phytophagous Heteroptera assemblages associated with the three habitat types revealed in Figure 1a show a successional trend in the kind of host plant used (Figure 2). One of the most obvious features of these results is the trend towards grass-feeding species in mid-succession, which is much more marked than in previous studies using a multi-site approach (Southwood, Brown & Reader, 1979; Brown, 1985). The importance of woody plants to woodland herbivores is, of course, unsurprising.

The phytophagous Heteroptera show a strong successional trend of increasing host plant specialization (Fig. 3), with generalists predominant early in succession and strict specialists predominant in the woodland. This result is similar to that reported by Brown (1985) using the mixed site approach, but remarkably different from the pattern observed in phytophagous Coleoptera assemblages (see Brown & Hyman, 1986), where generalists like the weevils *Phyllobius maculicornis* Germar and *P. pyri* (L.) were the most abundant species in the woodland.

Brown (1982) showed that the range of size and shapes of Heteroptera species represented in the assemblages increases with successional age. Brown associated this with increased structural diversity of the vegetation. Since the Heteroptera have a number of feeding strategies caution is needed in interpreting this in terms of the relationship between habitat stability and size (Lövei & Magura, 2006), but the pattern is similar to that found in the lacewings (Hollier, 2008) with a dual effect of

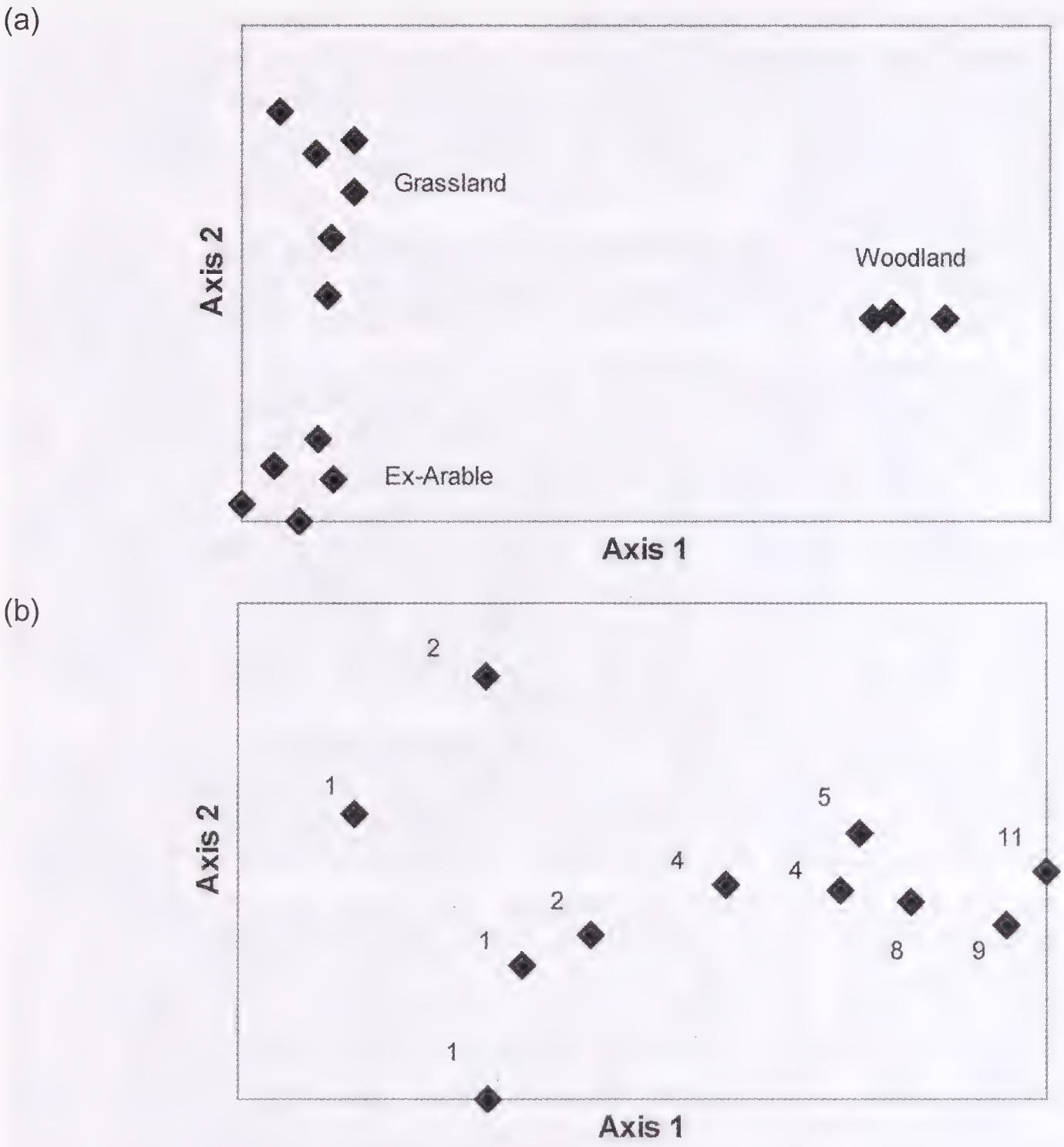

Figure 1. The distribution of the Heteroptera assemblages studied on the first two axes of Reciprocal Averaging Analysis (a) All assemblages, showing the division into ex-arable, grassland and woodland clusters. (b) The assemblages excluding the woodland sites; numbers denote site age in years.

stability leading to a greater size range and larger species, and also to the average size decreasing due to the abundance of smaller species in late succession.

It is also interesting that there is a successional change among the non-herbivores. Most predacious Heteroptera are not specialists, but there are differences in the kind of plants preferred as a substrate for hunting. Thus nabids like *Nabis ferus* (L.) and *N. rugosus* (L.) that mainly hunt in grassland are more abundant in mid-succession while anthocorids like *Anthocoris confusus* Reuter and *A. nemoralis* (F.) that mainly hunt on woody plants are much more abundant in woodland. There are exceptions in both groups; *Anthocoris nemorum* (L.) is found in earlier successional habitats while the nabid *Himacerus apterus* (F.) is arboreal (although not taken in this study). The observed successional effect is therefore indirectly due to the change in structural diversity of the habitats, exactly as Southwood, Brown & Reader (1979) suggested. The overall pattern is confused by the fact that many herbivorous species typical of later successional habitats are in fact partial or facultative predators.

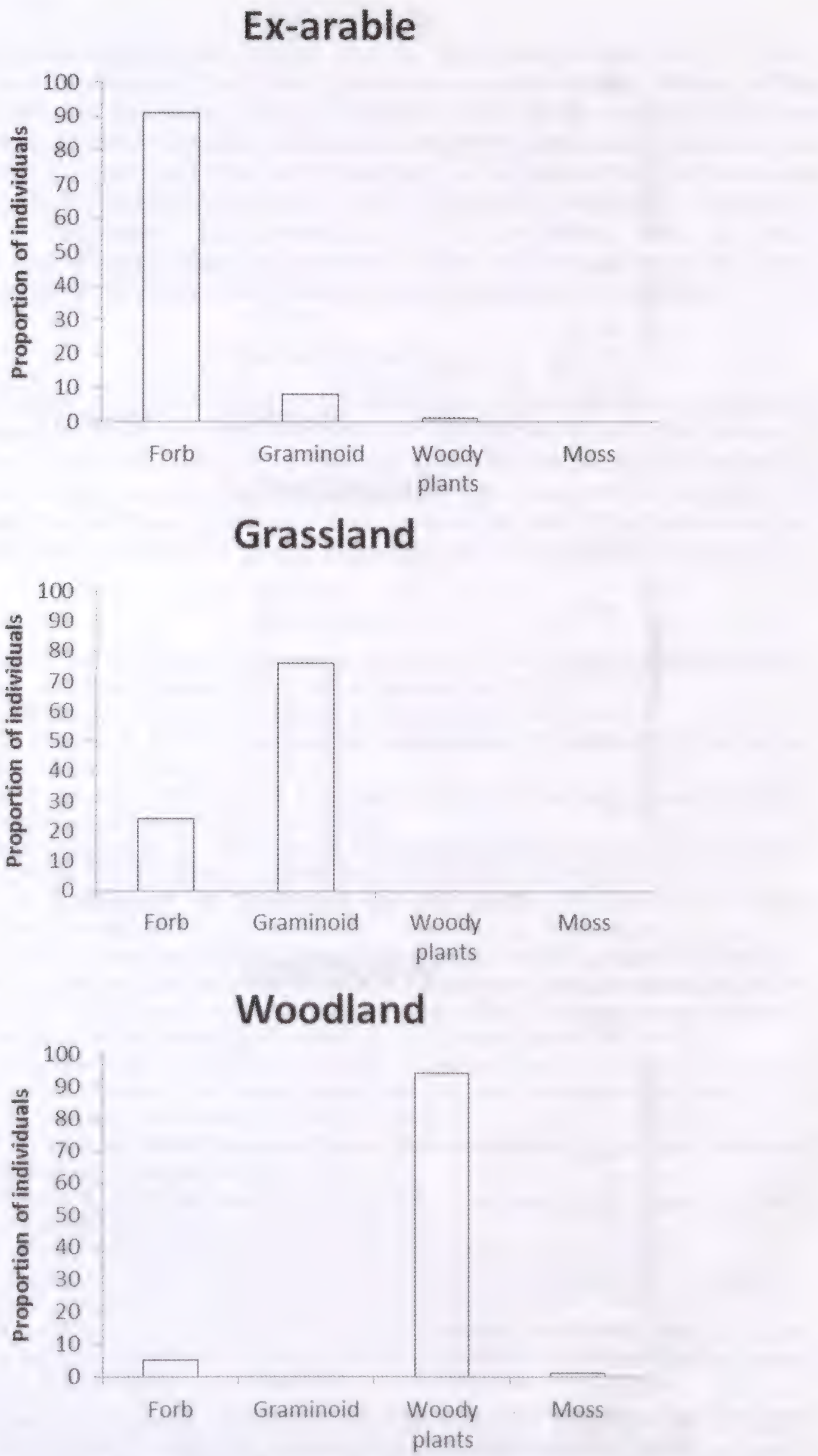

Figure 2. The host plant associations of Heteroptera associated with each habitat (the three groupings in Fig. 1a) expressed as the percentage of specimens in each category.

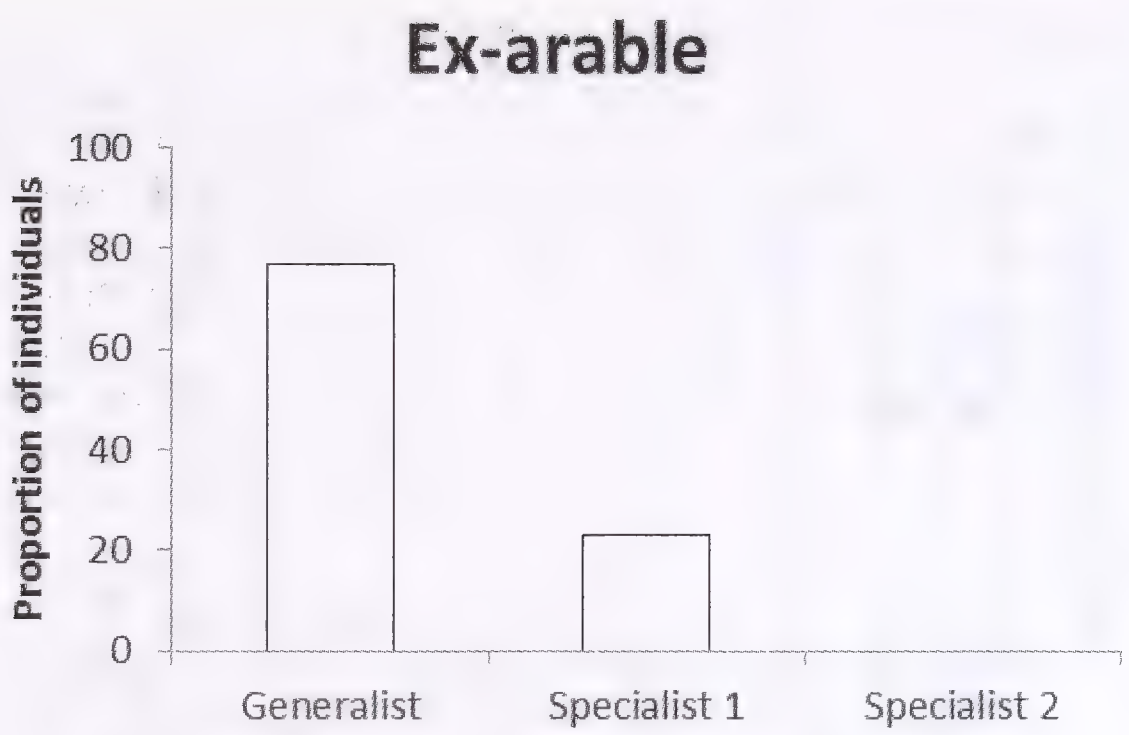

Figure 3. The degree of host-plant specialization of the Heteroptera associated with each habitat, expressed as the percentage of specimens in each category. Specialization here is defined as: generalist – feeds on several plant families; specialist 1 – feeds on one or two related plant families; specialist 2 – only feeds on up to three related plant genera.

Conclusions

The Heteroptera assemblages studied show a clear successional trend in their composition and the degree of host plant specialisation exhibited. The findings of this paper confirm those of Southwood, Brown & Reader (1979) and Brown (1985), but are more robust because the development of the assemblages of early to mid-succession was directly observed for individual sites rather than being extrapolated from different sites of known age which could have differed in terms of physical or ecological parameters independent of succession. The resampling of the woodland after 15 years demonstrated that the assemblage had remained stable and this validates the use of the data in studies of the relationship between body size and habitat stability.

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References

Brown, V. K. 1982. Size and shape as ecological discriminants in successional communities of Heteroptera. *Biological Journal of the Linnean Society* **18**: 279–290.

Brown, V. K. 1985. Insect herbivores and plant succession. *Oikos* **44**: 17–22.

Brown, V. K. & Hyman, P. S. 1986. Successional communities of plants and phytophagous Coleoptera. *Journal of Ecology* **74**: 963–975.

de Jong, Y. S. D. M. (ed.) 2013. *Fauna Europaea* version 2.6. Available online at http://www.faunaeur.org [accessed 10 October 2013].

Edwards, G. R. & Crawley, M. J. 1999. Effects of disturbance and rabbit grazing on seedling recruitment of six mesic grassland species. *Seed Science Research* **9**: 145–156.

Henderson, P. A. & Seaby, R. M. H. 2002. Community Analysis Package 2.15. PISCES Conservation, Lymington.

Hollier, J. A. 2006. Host plant use by *Ischnodemus sabuleti* (Fallén, 1826) (Heteroptera: Lygaeidae) in a dry grassland in southern Britain. *Entomologist's monthly Magazine* **142**: 80.

Hollier, J. A. 2007. Stratification and phenology of a woodland Heteroptera assemblage in southern Britain. *British Journal of Entomology and Natural History* **20**: 49–55.

Hollier, J. A. 2008. Body size and habitat stability – a comparison of lacewing (Neuroptera: Chrysopidae and Hemerobiidae) assemblages from different successional habitats. *British Journal of Entomology and Natural History* **21**: 31–35.

Hollier, J. A. & Belshaw, R. 1992. Changes in Neuroptera assemblages in an old field succession in Southern Britain. *Entomologist*. **111**: 158–165.

Hollier, J. A., Brown, V. K. & Edwards-Jones, G. 1994. Successional leafhopper assemblages: Pattern and process. *Ecological Research* **9**: 185–191.

Kirby, P. 1992. *Review of scarce and threatened Hemiptera*. JNCC, Peterborough.

Lövei, G. L. & Magura, T. 2006. Body size changes in ground beetle assemblages – a re-analysis of Braun *et al.* (2004)'s data. *Ecological Entomology* **31**: 411–414.

Mortimer, S. R., Hollier, J. A. & Brown, V. K. 1998. Interactions between plant and insect diversity in the restoration of lowland calcareous grasslands in southern Britain. *Applied Vegetation Science* **1**: 101–114.

Southwood, T. R. E., Brown, V. K. & Reader, P. M. 1979. The relationships of plant and insect diversities in succession. *Biological Journal of the Linnean Society* **12**: 327–348.

Southwood, T. R. E. & Leston, D. 1959. *Land and water bugs of the British Isles*. Warne, London.

Appendix. The number of specimens of each species of Heteroptera captured (raw data). Nomenclature follows de Jong (2013)

Year that old-field succession started	1977	1984	1985	1977	1984	1977	1984	1983	1981	1979	1977	1900	1900	1900
Year of sampling	1977	1984	1985	1978	1985	1980	1987	1987	1988	1987	1987	1977	1978	1991
Acalypta parvula (Fallén)	–	1	–	1	1	–	–	3	–	–	–	–	1	–
Acetropis gimmerthalii (Flor)	–	–	–	15	–	–	–	–	–	–	–	–	–	–
Adelphocoris lineolatus (Goeze)	–	–	1	–	–	–	–	–	–	–	–	–	–	–
Aelia acuminata (L.)	–	–	1	–	1	–	–	–	–	1	–	–	–	–
Agramma laetum (Fallén)	–	–	–	–	–	–	–	1	1	–	–	–	–	–
Amblytylus nasutus (Kirschbaum)	1	–	–	11	4	–	5	–	–	–	–	–	–	–
Anthocoris confusus Reuter	–	–	–	–	–	–	–	–	–	–	–	8	4	24
Anthocoris nemoralis (F.)	–	–	–	–	–	–	–	–	–	–	–	2	–	65
Anthocoris nemorum (L.)	–	2	–	–	4	–	–	–	–	1	–	–	2	1
Asciodema obsoleta (Fieber)	–	–	1	–	–	–	–	–	–	–	–	–	–	–
Berytinus minor (Herrich-Schaeffer)	–	5	1	2	–	6	2	29	–	–	–	–	–	–
Berytinus montivagus (Meyer-Dür)	–	1	–	–	–	–	–	–	–	4	–	–	–	–
Berytinus signoreti (Fieber)	–	–	–	–	–	–	–	10	–	–	2	–	–	–
Blepharidopterus angulatus (Fallén)	–	–	–	–	–	–	–	–	–	–	–	44	17	92
Campylomma virgula (Herrich-Schaeffer)	–	–	–	–	–	–	–	–	–	–	–	–	–	13
Capsus ater (L.)	–	–	2	–	5	–	1	2	20	2	4	–	–	–
Ceraleptus lividus Stein	–	–	–	–	–	–	–	–	–	–	1	–	–	–
Chlamydatus pullus (Reuter)	1	2	–	1	–	–	–	–	–	–	–	–	–	–
Closterotomus norwegicus (Gmelin)	6	–	1	6	3	–	–	1	–	–	–	–	–	–
Coreus marginatus (L.)	–	1	1	–	–	–	–	–	–	–	–	–	–	–
Coriomeris denticulatus (Scopoli)	1	–	–	–	–	2	–	–	–	1	–	–	–	–
Cymus claviculus (Fallén)	–	24	15	–	3	–	1	–	1	–	–	–	–	–
Cymus melanocephalus Fieber	–	2	–	–	–	–	–	–	–	–	–	–	–	–
Cyrtorhinus caricis (Fallén)	–	1	–	–	–	–	–	–	–	–	–	–	–	–
Deraeocoris lutescens (Schilling)	–	–	–	–	–	–	–	–	–	–	–	3	–	2
Derephysia foliacea (Fallén)	–	–	–	–	–	–	–	–	–	–	1	–	–	–
Dicyphus epilobii Reuter	–	7	–	–	–	–	2	1	–	–	–	–	–	–
Dicyphus errans (Wolff)	–	3	–	–	3	–	–	–	–	–	–	–	–	–
Dicyphus globulifer (Fallén)	–	–	–	–	–	1	–	–	–	–	–	–	–	–

continued

Appendix. The number of specimens of each species of Heteroptera captured (raw data). Nomenclature follows de Jong (2013) *(continued)*

Year that old-field succession started	1977	1984	1985	1977	1984	1977	1984	1983	1981	1979	1977	1900	1900	1900
Year of sampling	1977	1984	1985	1978	1985	1980	1987	1987	1988	1987	1987	1977	1978	1991
Dicyphus pallicornis (Fieber)	–	–	–	–	–	–	1	–	–	–	–	–	–	–
Dolycoris baccarum (L.)	–	–	1	–	–	–	–	–	–	–	–	–	–	–
Drymus brunneus (Sahlberg)	–	–	–	2	–	–	–	–	–	–	–	34	4	1
Drymus sylvaticus (F.)	–	–	5	–	12	–	3	–	1	2	–	2	2	–
Dryphilocoris flavoquadrimaculatus (DeGeer)	–	–	–	–	–	–	–	–	–	–	1	1	–	2
Elasmostethus interstinctus (L.)	–	–	–	–	–	–	–	–	–	–	–	33	10	269
Elasmucha grisea (L.)	–	–	–	–	–	–	–	–	–	–	–	5	5	17
Eurydema oleracea (L.)	–	–	5	–	–	–	–	–	–	–	–	–	–	2
Eysarcoris venustissimus (Schrank)	–	–	1	–	–	–	–	–	–	–	–	–	–	–
Harpocera thoracica (Fallén)	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Heterotoma merioptera (Scopoli)	–	–	–	–	–	–	–	–	–	–	–	1	–	–
Himacerus boops (Schiødte)	–	–	–	–	–	–	–	–	–	1	–	–	–	–
Himacerus major Costa	–	1	4	1	–	–	–	–	1	–	–	2	–	–
Himacerus mirmicoides (Costa)	–	1	1	–	1	–	–	–	–	–	–	–	–	–
Ischnodemus sabuleti (Fallén)	–	–	–	–	–	–	1	–	4	89	1095	–	–	–
Kleidocerys resedae (Panzer)	–	–	–	–	–	–	–	–	–	–	–	283	449	3660
Leptopterna dolobrata (L.)	–	–	–	–	3	–	3	–	–	1	2	–	–	–
Leptopterna ferrugata (Fallén)	–	–	–	3	1	–	1	–	–	–	–	–	–	–
Lopus decolor (Fallén)	–	1	–	–	–	–	26	26	10	4	3	–	–	1
Loricula coleoptrata (Fallén)	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Loricula distinguenda Reuter	–	–	–	–	–	–	–	–	–	–	–	40	25	–
Loricula elegantula (Baerensprung)	–	–	–	–	–	–	–	–	–	–	–	2	–	4
Lygus rugulipennis Poppius	68	48	41	2	3	–	–	1	–	–	–	–	–	–
Megaloceroea recticornis (Geoffroy)	–	–	–	–	1	–	1	–	–	1	–	–	–	–
Miris striatus (L.)	–	–	–	–	–	–	–	–	–	–	–	1	1	2
Monalocoris filicis (L.)	–	–	–	–	–	–	–	–	–	–	–	31	5	–
Myrmus miriformis (Fallén)	–	–	–	–	–	–	–	–	–	1	1	–	–	–
Nabis ferus (L.)	14	6	11	4	2	4	–	–	–	–	–	–	–	–
Nabis flavomarginatus Scholtz	–	1	2	–	1	–	–	–	2	–	1	–	–	–

continued

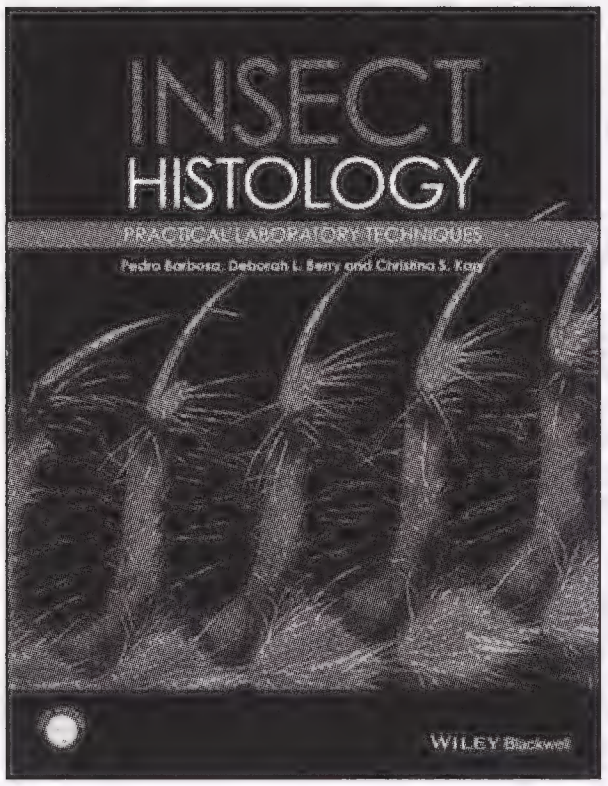
Appendix. The number of specimens of each species of Heteroptera captured (raw data). Nomenclature follows de Jong (2013) *(continued)*

Year that old-field succession started	1977	1984	1985	1977	1984	1977	1984	1983	1981	1979	1977	1900	1900	1900
Year of sampling	1977	1984	1985	1978	1985	1980	1987	1987	1988	1987	1987	1977	1978	1991
Nabis limbatus Dahlbom	–	1	1	–	1	–	1	2	4	–	10	4	1	–
Nabis rugosus (L.)	1	9	6	7	23	8	3	–	4	2	4	4	3	–
Neolygus contaminatus (Fallén)	–	–	–	–	–	–	–	–	–	–	–	26	61	88
Neottiglossa pusilla (Gmelin)	–	–	–	–	–	–	–	–	–	–	1	–	–	–
Notostira elongata (Geoffroy)	–	–	1	–	–	2	2	1	3	–	–	–	–	–
Nysius ericae (Schilling)	16	–	–	12	–	–	–	1	–	–	2	–	–	–
Orius niger (Wolff)	1	–	–	–	–	–	–	–	–	–	–	–	–	5
Orius sp.	–	3	3	–	2	–	–	–	–	–	–	–	–	–
Orthocephalus saltator (Hahn)	–	–	–	–	–	–	–	4	4	–	–	–	–	–
Orthotylus flavosparsus (Sahlberg)	17	3	–	2	–	–	–	–	–	–	–	–	–	–
Orthotylus marginalis Reuter	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Pantilius tunicatus (F.)	–	–	–	–	–	–	–	–	–	–	–	1	7	–
Pentatoma rufipes (L.)	–	–	–	1	–	–	–	–	–	–	–	–	–	3
Peritrechus geniculatus (Hahn)	–	–	2	1	1	–	3	1	2	–	–	–	–	1
Phylus melanocephalus (L.)	–	–	–	–	–	–	–	–	–	–	–	–	1	1
Phytocoris dimidatus Kirschbaum	–	–	–	–	–	–	–	–	–	–	–	1	–	5
Phytocoris longipennis Flor	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Phytocoris tiliae (F.)	–	–	–	–	–	–	–	–	–	–	–	1	3	16
Phytocoris varipes Boheman	–	1	1	–	–	–	2	–	–	2	–	–	–	–
Piesma maculatum (Laporte)	–	1	2	–	1	1	–	–	–	–	–	–	–	–
Pithanus maerkeli (Herrich-Schaeffer)	–	–	–	–	–	–	–	–	1	–	1	–	–	–
Plagiognathus arbustorum (F.)	–	–	–	–	4	–	–	1	2	8	1	–	–	1
Plagiognathus chrysanthemi (Wolff)	4	6	34	35	–	25	30	35	12	15	4	–	–	1
Podops inuncta (F.)	–	–	–	–	1	–	–	–	–	–	–	–	–	–
Psallus ambiguus (Fallén)	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Psallus betuleti (Fallén)	–	–	–	–	–	–	–	–	–	–	–	–	3	–
Psallus falleni Reuter	–	–	–	–	–	–	–	–	–	–	–	6	1	38
Psallus perrisi (Mullant & Rey)	–	–	–	–	–	–	–	–	–	1	1	7	4	49
Psallus haematodes (Gmelin)	–	–	–	–	–	–	–	–	–	–	–	–	–	1

continued

Appendix. The number of specimens of each species of Heteroptera captured (raw data). Nomenclature follows de Jong (2013) *(continued)*

Year that old-field succession started	1977	1984	1985	1977	1984	1977	1984	1983	1981	1979	1977	1900	1900	1900
Year of sampling	1977	1984	1985	1978	1985	1980	1987	1987	1988	1987	1987	1977	1978	1991
Psallus varians (Herrich-Schaeffer)	–	–	–	–	–	–	–	–	–	–	–	12	7	15
Rhabdomiris striatellus (F.)	–	–	–	–	–	–	–	–	–	–	–	–	–	4
Rhopalus subrufus (Gmelin)	–	–	–	–	–	–	1	1	–	–	–	–	–	–
Saldula saltatoria (L.)	–	–	2	–	1	–	–	–	–	–	–	–	–	–
Salicarus roseri (Herrich-Schaeffer)	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Scolopostethus affinis (Schilling)	–	–	–	–	–	–	1	–	–	–	–	–	1	–
Scolopostethus decoratus (Hahn)	–	–	–	–	–	–	–	–	–	–	–	2	1	–
Scolopostethus thomsoni Reuter	–	–	–	–	–	–	8	–	–	–	1	9	–	1
Stenodema calcarata (Fallén)	3	1	–	7	2	1	8	1	21	–	7	–	–	–
Stenodema laevigata (L.)	–	–	–	–	–	4	5	–	2	13	55	–	2	–
Stenotus binotatus (F.)	–	1	–	–	–	–	1	–	14	3	2	–	–	–
Stygnocoris fuligineus (Geoffroy)	1	8	22	71	43	–	4	–	–	–	1	–	–	–
Stygnocoris sabulosus (Schilling)	–	2	–	6	3	5	–	1	7	6	4	120	53	–
Taphropeltus contractus (Herrich-Schaeffer)	–	–	–	2	–	–	–	–	–	–	–	1	–	–
Tingis ampliata (Herrich-Schaeffer)	–	–	–	–	–	–	2	4	17	18	34	–	–	–
Trapezonotus arenarius (L.)	1	–	–	–	–	–	–	–	–	–	–	–	–	–
Trigonotylus ruficornis (Geoffroy)	1	–	–	1	–	–	–	–	1	–	–	–	–	–
Troilus luridus (F.)	–	–	–	1	–	–	–	–	–	–	–	–	–	–
Tytthus pygmaeus (Zetterstedt)	–	2	–	2	–	–	3	14	15	2	1	–	–	–



BOOK REVIEW

Insect Histology: Practical Laboratory Techniques by Pedro Barbosa, Deborah Berry and Christina K. Kary. (Wiley-Blackwell, 2014). 386pp. Softback £39.99. ISBN: 978-1-4443-3696-2.

Admittedly this book is aimed more at professional than amateur entomologists, but if you happen to pass that threshold and wish to know more about insect internal anatomy: brain structure, the different kinds of digestive systems and how they cope with food, the development of eggs and sperm, the micro-structure of receptor cells in antennae and other organs, the arrangement of muscles for flight or egg-laying, the latter often a diagnostic feature in species identification, then the techniques described here will be of great use. Having spent my early research career studying postembryonic development in flies and dissecting and staining innumerable fly larvae this book is a must, though it must be admitted that many of the modern techniques cannot be undertaken except in a properly equipped laboratory. As an aside wouldn't it be wonderful if one day our Society could afford to house a scanning electron (SEM) or transmission electron (TEM) microscope? – I believe every entomologist should have the opportunity of using one and to experience the exhilarating power of magnifying specimens by factors of 100, or 1000 × at a single twist of the dial.

The lead author, Dr Pedro Barbosa, Professor Emeritus at the Department of Entomology of the University of Maryland, is the only practising entomologist of the three, but Drs Deborah Berry and Christina Kary with medical and chromosome biology backgrounds respectively, contribute equally in describing a wide array of new techniques that entomologists should be aware of. For example it is not widely known how important (i.e. crucial) bacteria are to insects – herbivorous species would certainly die quickly without them, and so histological/marker techniques to locate these and to determine how and when they are active are critical to our understanding of insect biology. SEM and TEM techniques have shown that individual honeybees may contain a mix of insect viruses, not just wing-deformed virus, a major hive killer, but other potentially debilitating types whose roles are far from certain. Indeed there is evidence that the viruses are hybridising to create even more complex virus communities. This book certainly helps in explaining which techniques might be most rewarding to use. It presents all of the necessary information you will need for the preparation of histological slides of all types of insect tissues. It explains the essential procedures for their preparation, providing step-by-step information on each phase, for example, on fixation, dehydrating, clearing, embedding, and staining. Selected photographs show the likely results of procedures, components of the process, and advantages of the use of particular approaches or stains. The main topics covered include: (i) histological problems encountered in insect tissues such as sclerotized chitin, yolk-laden eggs, chromosomes, genitalia etc., and how to deal with them (ii) important approaches for the preparation of tissues and organs for SEM and TEM Fluorescence (iii) new immunohistochemical techniques and (iv) the use of genetic markers in insect histology.

A very useful book to have in your library.

JOHN BADMIN

A PRELIMINARY REPORT ON THE BEETLES OF PARSONAGE DOWN NATIONAL NATURE RESERVE, WILTSHIRE

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ABSTRACT

The results of a year-long pitfall and flight interception trapping exercise for beetles on Parsonage Down National Nature Reserve, Wiltshire, between March 2009 and February 2010 are listed together with the results of an earlier trapping exercise carried out by the Institute of Terrestrial Ecology (NERC) in the 1980s. The two surveys recorded almost 27,000 beetles belonging to 455 species of which 52 were either Rare or Nationally Notable. Dates for the first and last captures of each species are included when known and captures analysed by date and location. Discussion of the results emphasises the importance of the site in a Wiltshire context – more species were recorded here than in the nearby ancient woodland sites of Savernake Forest and Langley Wood. A detailed comparison of the two surveys is not attempted but some of the more obvious similarities and differences in the findings are mentioned together with useful information about the winter activity of beetles.

INTRODUCTION

Parsonage Down National Nature Reserve (the Robert Wales Memorial Reserve) at Winterbourne Stoke to the north west of Salisbury (SU 050412) is managed by Natural England as a working farm (Plate 2, Figs 1 & 2). The 276 hectares (680 acres) include some of the finest chalk grassland in Europe as well as an area of new downland. Until 1979 Robert Wales, the owner, had farmed the land by traditional methods for 53 years, grazing it fairly intensively with both cattle and sheep at a carefully regulated stocking rate, and Natural England maintains this system. The result is to produce a rather uniform sward with the advantages and disadvantages that that implies. The current survey involving primarily pitfall traps but also some bottle flight interception traps took place on the agriculturally unimproved Old and Castle Downs (147 hectares, 363 acres). In addition a number of visits were made to sample the scrub area at the northwest end of Castle Down by sweeping and beating. As a result of the concentration on the study of the flora very few published records of beetles exist, the most important of which are those included in M. G. Morris's two part 'A Preliminary List of the Weevils of Wiltshire' (Morris, 1972, 1973).

The botanically rich grassland at Parsonage Down which covers most of the site is boadly referable to the CG2 sheep's fescue – meadow oatgrass (*Festuca ovina – Avenula pratensis*) type (Rodwell, 1992). However red fescue (*Festuca rubra*) and downy oat-grass (*Avenula pubescens*) also occur in areas of herb rich turf. This unusual feature may be related to local soils and topography. A remarkable variety of vascular plants occur within the sward; 30 species being commonly recorded in a square metre. Twenty eight grasses and sedges occur on the site together with herbs which typify the south west Wiltshire chalk including saw-wort (*Serratula tinctoria*), devil's-bit scabious (*Succisa pratensis*) and yellow rattle (*Rhinanthus minor*).

The current survey was undertaken on a voluntary basis but with the full support and co-operation of Natural England's staff at the reserve headed by Roger Marris.

They installed fencing around the trap sites to prevent damage by cattle and kindly provided a Land Rover. At the time of beginning the survey nothing was known of earlier surveys. A particular source of inspiration in working on the Down was provided by the late A. A. Allen who informed me that if any overlooked native species of beetle were to be found in England there was a good chance they would turn up at Parsonage Down! Unfortunately this expectation proved to be unfounded.

During the course of carrying out the survey extensive searches were made through Natural England's archives both at the reserve and at their offices in Devizes to find earlier records. These resulted in the discovery of several incomplete and undated lists of beetles made during surveys by the Institute of Terrestrial Ecology (Natural Environment Research Council) in the 1980s. After consulting with Dr Mike Morris, previously Head of the ITE's Furzebrook Research Station, Wareham, a file labelled 'Parsonage Down' was located in his attic which contained information filling in some of the missing details. The file also contained a typescript report to the Nature Conservancy Council (South Region) dated March 1990, by M. G. Morris, W. E. Rispin and R. G. Snazell, titled *Invertebrate Assessment of Intensively-Studied NNRs* (*Old Winchester Hill and Parsonage Down*) (Project T 09 056 15) which included lists of beetles and other insects. This report was used in the compilation of an anonymous typescript *Species List*, including species statuses graded from Local to Indeterminate, and in an anonymous list of *Beetle Notifications,* which were found in the office at the reserve. From correspondence with Martin Luff, who wrote to me in 2012 when compiling my book *Wiltshire Beetles* (Darby, 2009a) it is clear that many of the species determinations for the pitfall traps were made by himself with one, the ptiliid *Oligella foveolata* (Allibert) by Colin Johnson. All other determinations appear to have been made by Ed Rispin and other ITE staff, apart from the weevils which were identified by Mike Morris.

Methods

Recent survey

Four lines of nine pitfall traps each, were set up according to the Newcastle University Pitfall Protocol (Luff, 1996) in three areas fenced off to avoid damage by cattle (Fig. 1 A, B, C & D) (Plate 2, Figs. 3 & 4). Grid references for the sites were:

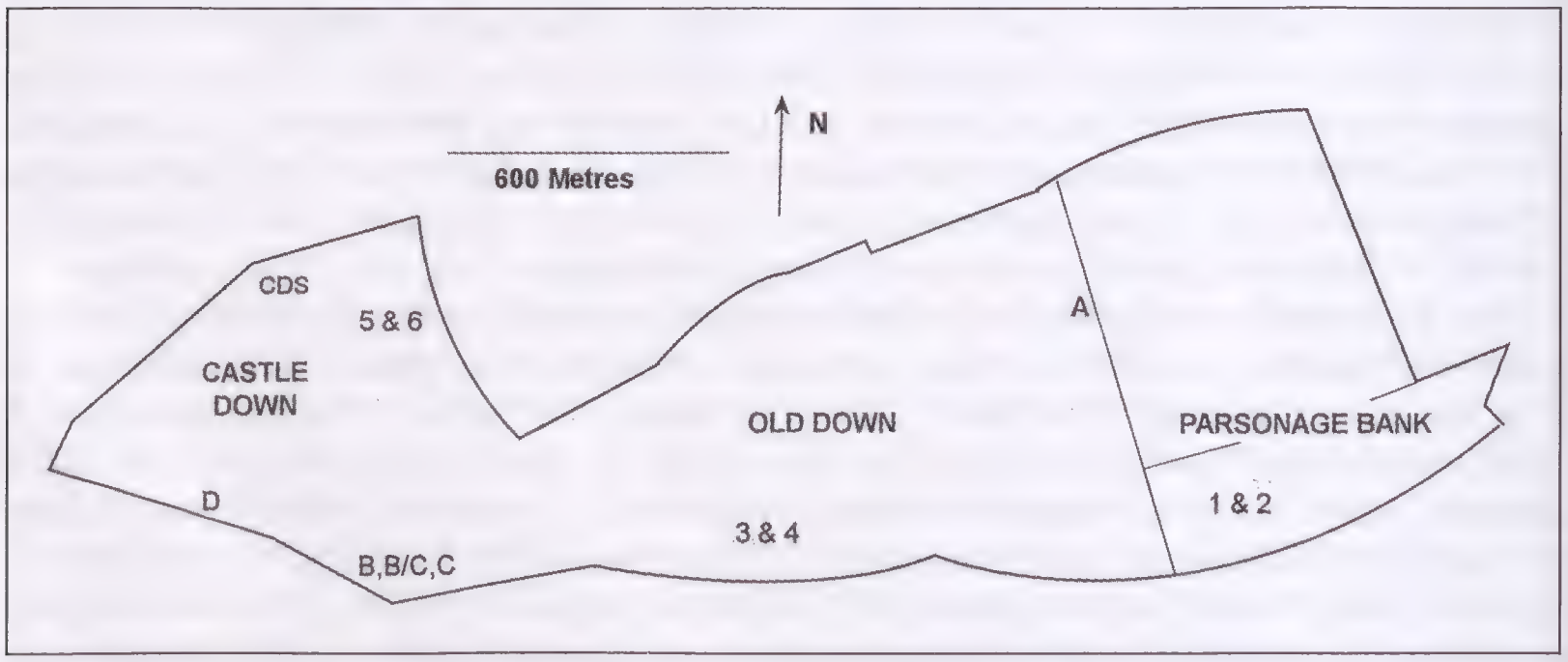

Fig. 1. Map of part of Parsonage Down National Nature Reserve, Wiltshire showing positions of trapping sites. CDS = Castle Down scrub. A, B, B/C, C & D = 2009/10 sites. 1–6 = approximate positions of Institute of Terrestrial Ecology 1980s sites.

A = SU057415, B, B/C, C = SU041409 and D = SU038411). Polypropylene pots of top diameter 75mm and depth 107mm were used set into the ground at 2m intervals so that their rims were slightly below the surface. Wire mesh ('chicken wire') of 2.5 cm diameter was placed over each to exclude small mammals. The traps were then filled to a depth of 1cm with a solution of ethylene glycol (Halfords neat blue anti-freeze). The traps were emptied approximately every month for a year and the contents of each row placed into a single marked container. The ethylene glycol was re-used whenever dilution by rainwater did not prevent it. The dates of emptying the traps, which were put in place on 16 March 2009, were: 8 April, 1 May, 28 May, 25 June, 27 July, 2 September, 30 September, 29 October, 3 December, 20 January 2010, 16 February, and 17 March 2010. The long gap between December and January was the result of the very cold weather when the Down was under snow and ice for much of the time.

Three window traps cut from 2 litre plastic water bottles were attached to the fence posts at each of the sites A and D, and a single run of four traps at sites B and C, referenced as B/C. These were orientated so that their openings faced into the reserve and they were emptied at the same time as the pitfall traps. Additionally some sweeping and beating for insects was carried out in the scrub area at the western area of the reserve on different occasions. All the material captured was sorted and identified off site using an Olympus BH2 compound microscope and a Wild/Leica M8 stereomicroscope. Voucher specimens were retained by the author.

It would have been preferable to have located sites B, C and D more centrally in the reserve away from the perimeter fencing so as to minimise the number of insects entering the traps from the surrounding fields, but funding and convenience obliged the use of existing fencing wherever possible. It might also have been useful to have located the trap sites in similar locations to those used by ITE (see below) so as to assist comparisons, but these were not known at the time.

Institute of Terrestrial Ecology survey

The protocols involved in the ITE survey are uncertain but some details can be worked out from the paperwork in the Morris file and at the Reserve. This makes clear that the sampling took place between 1983–1987 and that six sites were involved, two on Castle Down, two on Old Down and two on Parsonage Bank (Fig.1, sites 1–6). At the three pairs of sites D-Vac samples, heat extracted turves and pitfall traps were used. D-Vac samples were taken from 1983 to 1986, turves from 1985 to 1987, and pitfall traps in 1983 and 1984 with an additonal single collection in 1987. Morris explained to me *in litt* 'It is is not clear what the size of the D-Vac samples was, but from the sampling protocol is likely to have been 11 or 12 'sucks' per square metre'.

Specific information about trapping dates, etc, is not included in the report of Morris, Rispin & Snazell (1990) but can be gleaned from a number of manuscript 'sorting sheets'. These indicate that the first pitfall traps were put in place on 13 May 1983 when the first D-Vac samples were taken, and that further visits were made on 17 June, 14 July, 12 August, 26 August, an unspecified date in September, 7 October and 4 November 1983. In 1984 visits were made on 25 May, 21 June, 19 July and 16 August. Further visits may have been made in this year for D-Vac sampling but this is not clear. The sheets relating to 1985 mention only turf and D-Vac samples. the latter taking place on 26 June, 18 [no date but July assumed], 15 August, 29 August, 12 September, 10 October, 7 November and 24 December and the former on 22 November. The sheets relating to 1986 mention D-Vac samples being made on

2 January, 27 February, 27 March, 24 April, 22 May, 19 June and 17 July, and the final turf samples were taken on 14 March (presumed date) and 22 May. The number of pitfall traps used at each of the six locations appears to have been three but there was clearly interference by cattle and some were recorded as damaged by foxes which reduced the collections. Given the number of badgers present on the site it is likely that they may have been responsible for at least some of the damage attributed to foxes (Clarke, 1997). Pitfall trapping resumed for a short period in 1987 between 1 and 28 January when the survey was stopped. ITE had come under strong pressure at this time to take on more lucrative commissioned work and the Parsonage Down survey 'was continued, in a somewhat piecemeal fashion, but eventually it had to be quietly laid to rest' (Morris, pers.comm).

The beetles identified during this period were compiled from the lists mentioned above. The 1983 work, which appears to have been the most thorough carried out by the Institute of Terrestrial Ecology, at least from the pitfall trapping standpoint, is carefully detailed by Rispin in the 'sorting sheets' in the reserve office, where he lists all the beetles recorded, dates and trap locations including separate details of the D-Vac and turf samples (these are included in Appendix). The number of species from pitfall traps determined by Martin Luff was 93.

Calcareous Grassland Quality Index (CGQI)

This Index, which is fully explained in Darby (2009b), is based on Alexander's review of lowland calcareous grassland invertebrates (Alexander, 2003) in which he identified particular insects as of importance and assigned them ratings of 'low', 'medium' and 'high' according to their fidelity and continuity in the habitat. Fidelity helps in the identification of those species which should be priorities for conservation. High fidelity species occur primarily in calcareous grassland and are therefore strongly dependent on conservation of their habitat. Low fidelity species can be conserved in other habitat types and may not be a priority in calcareous grasslands. Continuity is important because it identifies sites which have species dependent on conservation at site level. A score of 1 was allocated to those species graded as 'low', 2 to those graded as 'medium' and 3 to those graded as 'high', and the site score calculated by adding these together, multiplying by a hundred and dividing by the number of species. This scoring system is based on the similar Index of Ecological Continuity used to assess pasture woodland sites (Alexander, 2004). The CGQI was developed as a means of helping to establish the relative importance of the numerous calcareous reserves and SSSIs in Wiltshire and has been applied to 31 sites in the county. It should be stressed, however, that it is still in process of development and will almost certainly require amendment in the future, in particular to specify minimum requirements for inclusion (Darby, 2009a).

Results

Adding together the results of both surveys 26,936 individual beetles were recorded representing 455 species. Of these 19,077 were recorded in the recent survey representing 316 species, and 7,859 representing 271 species in the ITE survey; some additional species were recorded as the result of casual collecting. Of the species found by ITE, 105 are listed without specific data on sites, numbers collected or dates, and 14 were determined by Martin Luff but do not appear in any lists. The two surveys together recorded 50 species of national importance of which 23 were Nb, 7 Na, 12 Notable, 1 RDBK, 5 RDB1, 2 RDB3 (Hyman & Parsons, 1992, 1994). The

statuses of some coleopterous families have recently been revised, but for simplicity the rankings given at the time have been retained. Thirty-two species with Calcareous Grassland Quality Index scores were recorded of which 3 species were recorded with a score of 1, 12 with a score of 2, 6 with a score of 3, 3 with a score of 4, 5 with a score of 5 and 3 with a score of 6, making the CGQI score for the reserve 312. The numbers of individuals and species recorded at each site and on each date, where known, are indicated in Figs 2–7. A comprehensive list of species, dates and sites is given in the Appendix.

Discussion

Comparison of the two surveys

This is a preliminary report with the primary objective of publishing a comprehensive list of beetle species for Parsonage Down NNR for the first time. There are enormous differences between the 1980s and 2009–2010 surveys with respect to methods, sampling dates, site locations and even the expertise of the determiners, so any detailed comparisons are likely to be difficult to achieve. The aim in this paper is simply to pick out a few of the more obvious commonalities and differences.

The first conclusion to be drawn is that the number of species recorded from the close cropped downland at Parsonage Down was greater than those for any other Wiltshire site including the important ancient woodland and wood pasture sites at Savernake Forest and Langley Wood NNRs (Darby, unpublished data). In the Wiltshire context it is also important to note that a large number of species recorded in the two surveys are the only records for the county, amongst the notable records are the fungus feeding leiodid *Liocyrtusa minuta* (Ahrens), the click beetles *Athous*

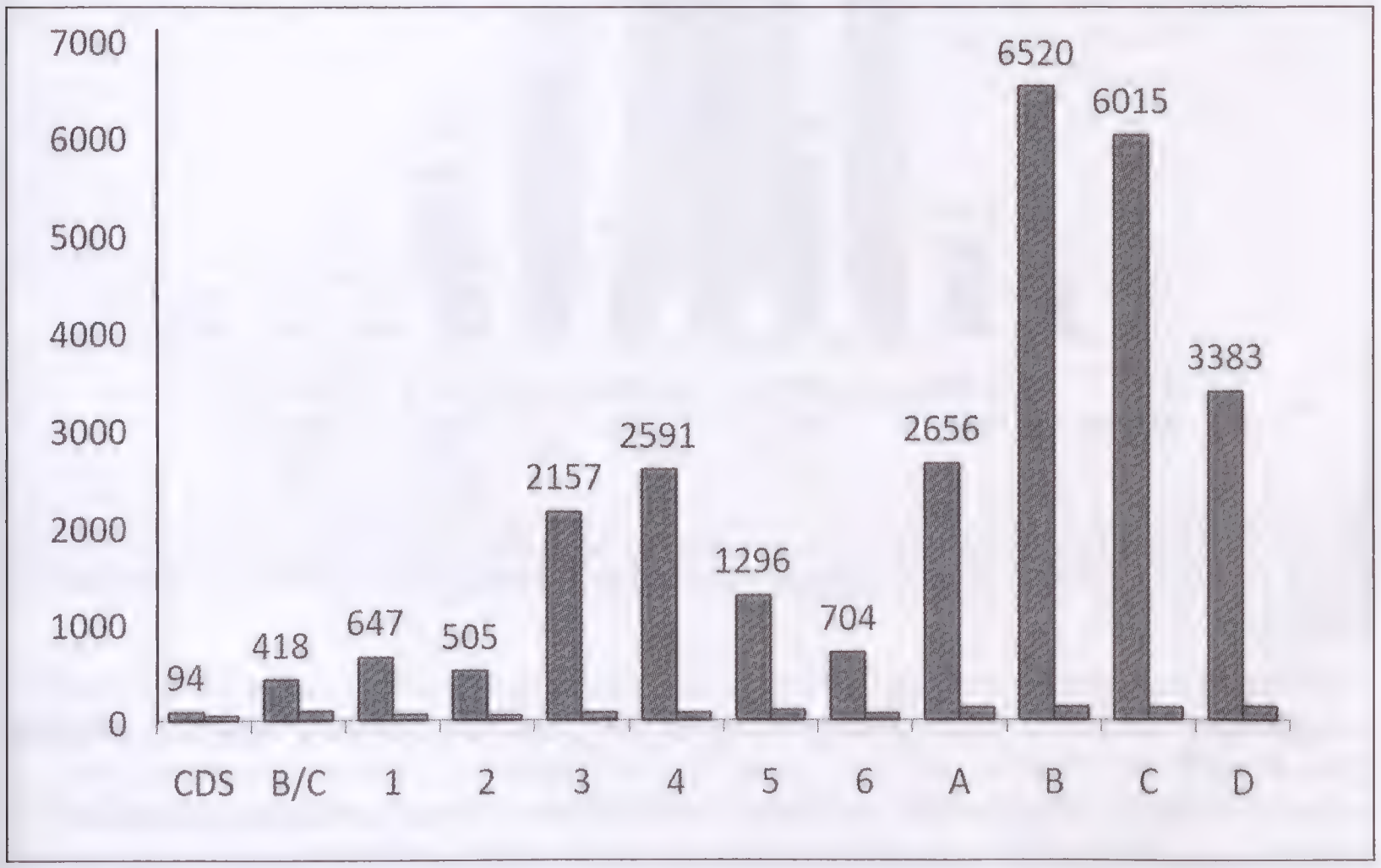

Fig. 2. Numbers of individuals of Coleoptera recorded at each trapping site at Parsonage Down NNR based on ITE (1980s) and current (2009/10) surveys. CDS = by grubbing, sweeping and beating. B/C = window traps at sites B and C. 1-6 = D-Vac, pitfall traps and turf samples. A and D = pitfall traps and window traps. B and C pitfall traps.

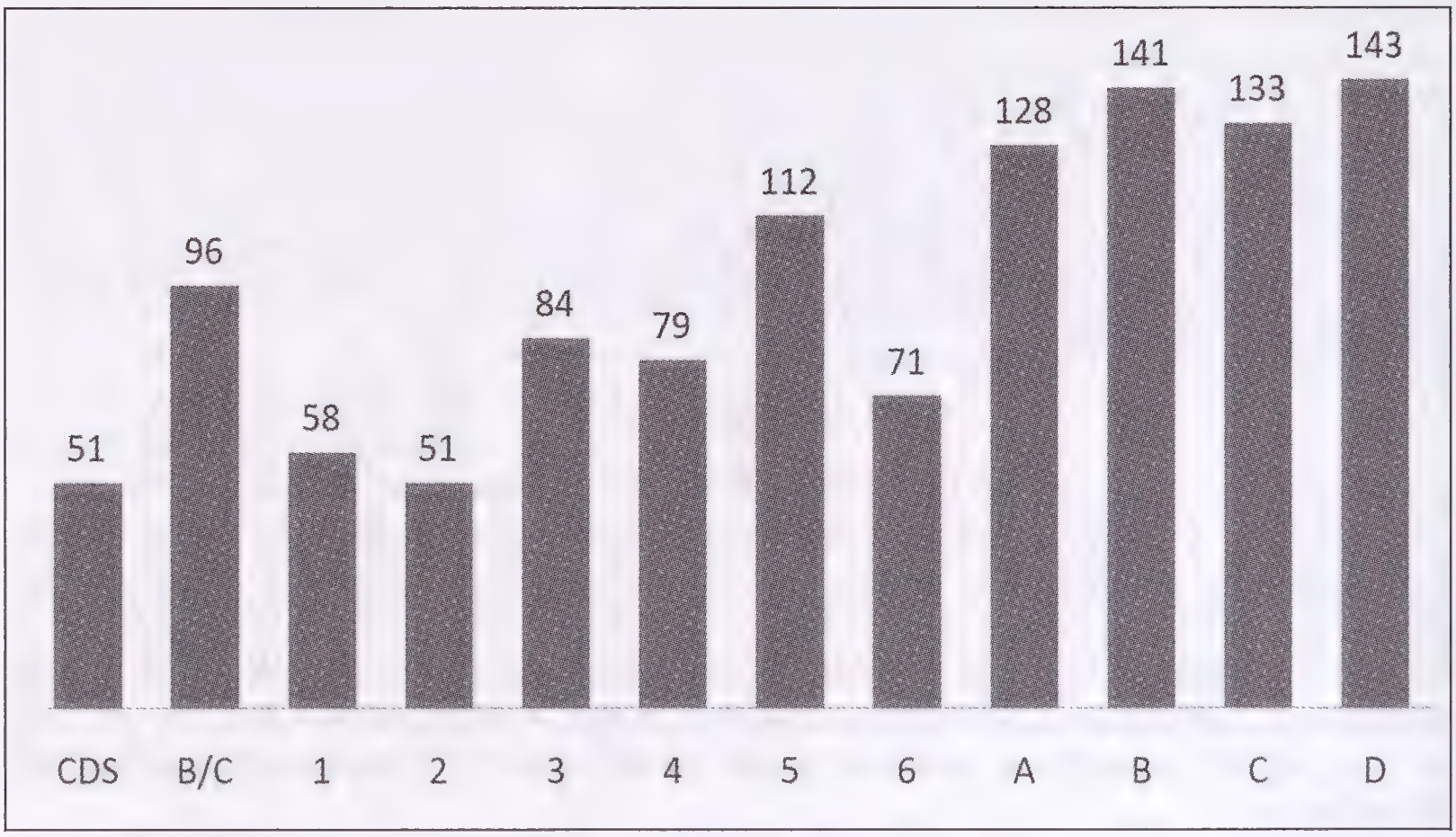

Fig. 3. Numbers of Coleoptera species recorded at each trapping site at Parsonage Down NNR based on ITE (1980s) and current (2009/10) surveys. CDS = grubbing, sweeping and beating. B/C = window traps at sites B and C. 1–6 = D-Vac, pitfall traps and turf samples. A and D = pitfall traps and window traps. B and C pitfall traps.

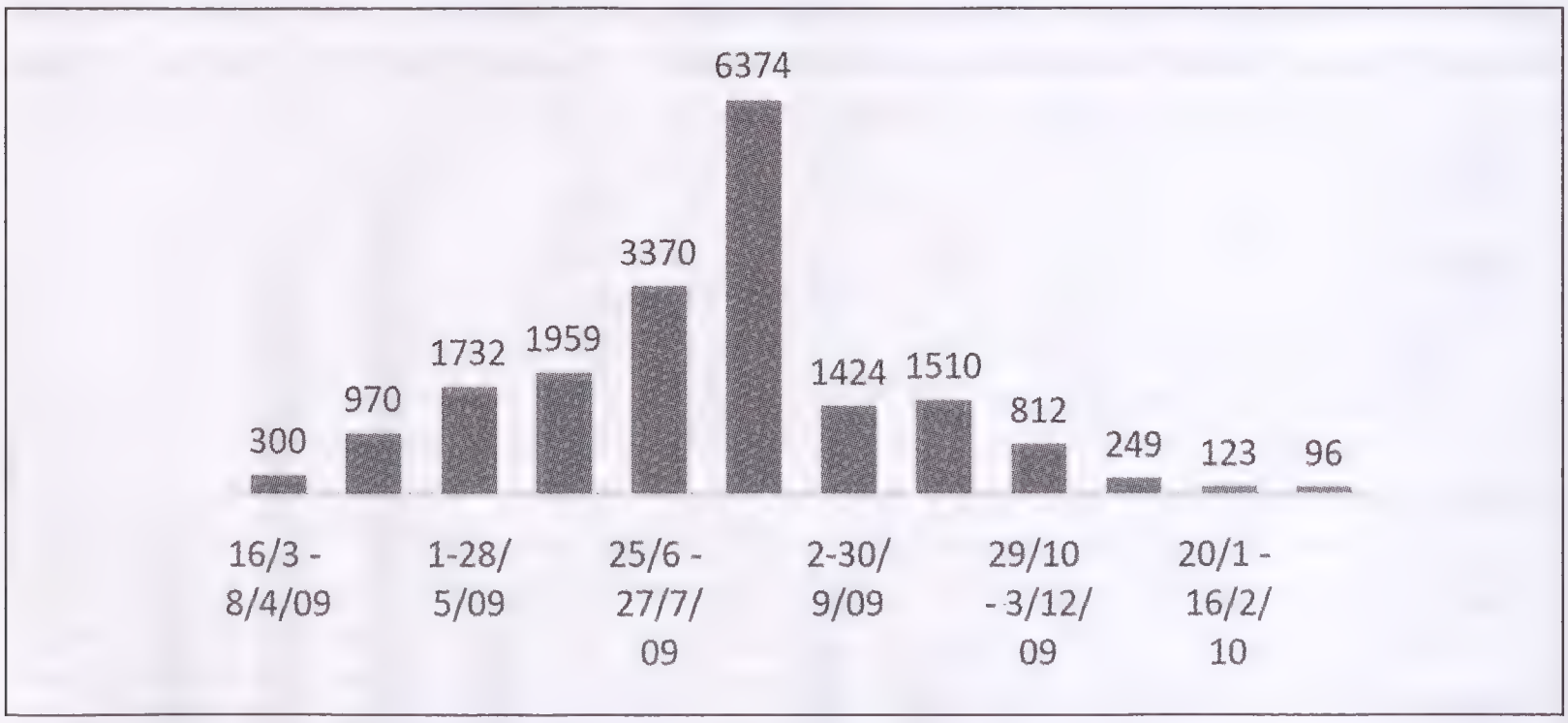

Fig. 4. Numbers of Coleoptera specimens recorded at Parsonage Down NNR on each date of the 2009/10 survey.

campyloides Newman, and *Agriotes sordidus* (Ill.), and the ladybird *Scymnus schmidti* Fursch.

One expected commonality revealed in the figures concerns the high numbers of specimens and species recorded in the summer months with both showing species numbers highest in June but individual numbers in many cases highest in July. Both surveys also showed a proportionately higher number of species on Castle Down at the western end of the site as opposed to those at the eastern end on Parsonage Bank and the eastern extremity of Old Down.

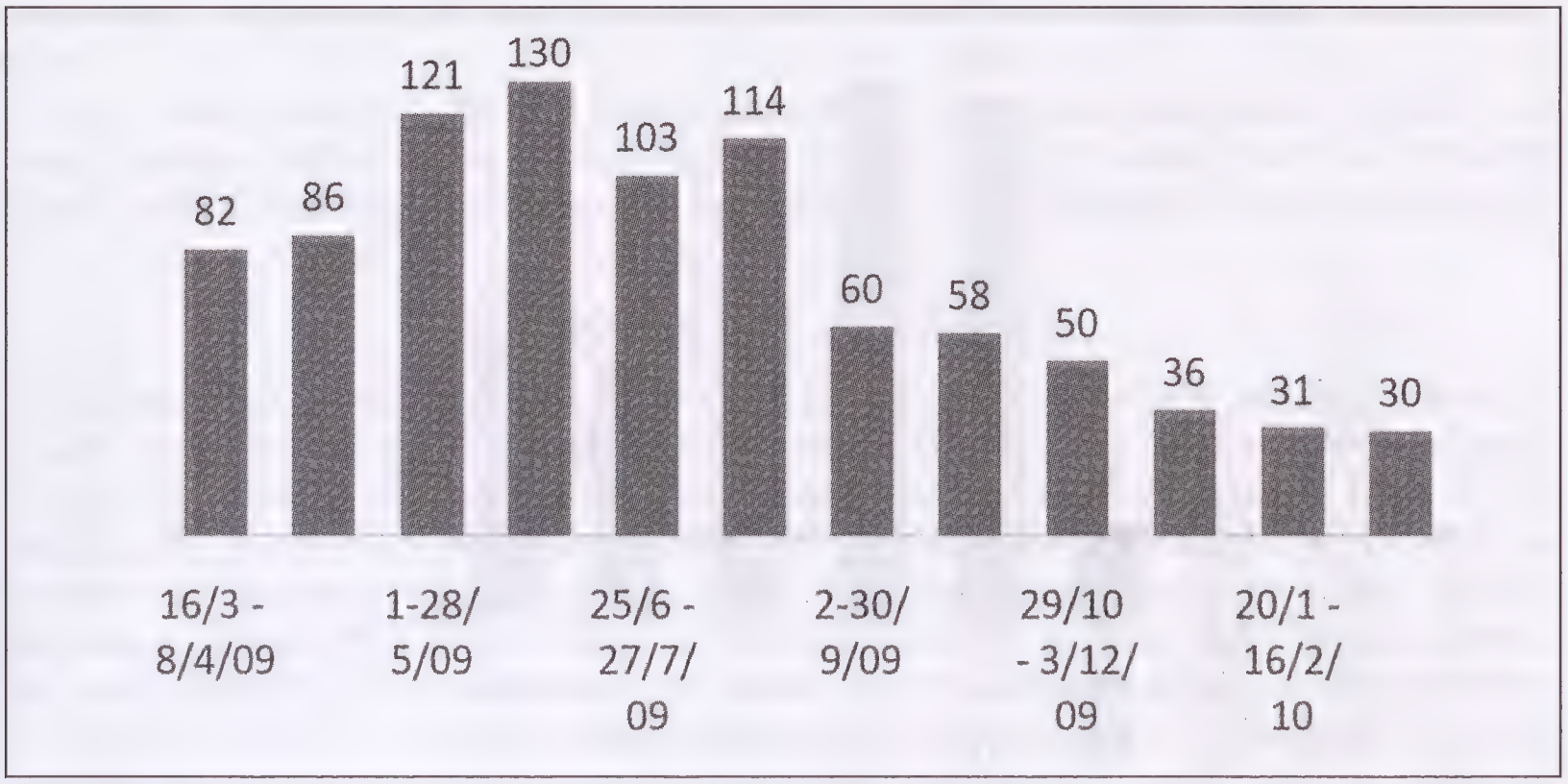

Fig. 5. Numbers of Coleoptera species recorded at Parsonage Down NNR on each date of the 2009/10 survey.

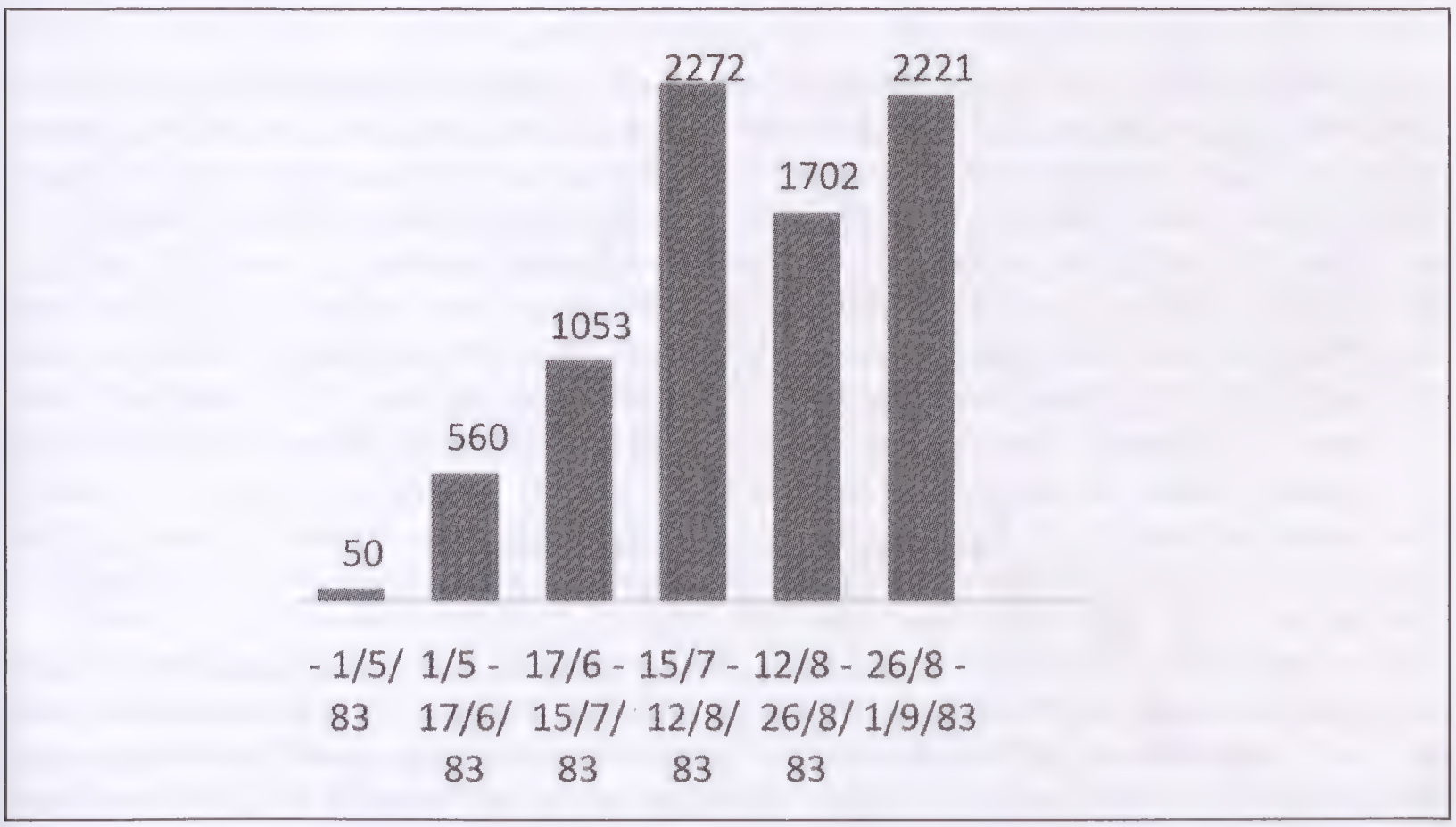

Fig. 6. Numbers of Coleoptera specimens recorded at Parsonage Down NNR on each date of the ITE survey.

Perhaps the most overt discrepancies concern the number of individuals of some species recorded. The ITE survey, for example, recorded 4,379 individuals of the flea beetle *Longitarsus pratensis* (Panzer) but the recent survey none at all. The 'sorting sheets' make clear that most were picked up by the D-Vacs (1,390 on 12 August alone) but at the same time 159 were also collected in the pitfall traps so that one might have expected the recent survey to have recorded some at least. The beetle feeds on plantains and the reduction in numbers may indicate that fewer *Plantago* plants are now present on the reserve. For other species matters were reversed. The recent survey recorded 1,512 specimens of the carrion beetle *Silpha tristis* Illiger,

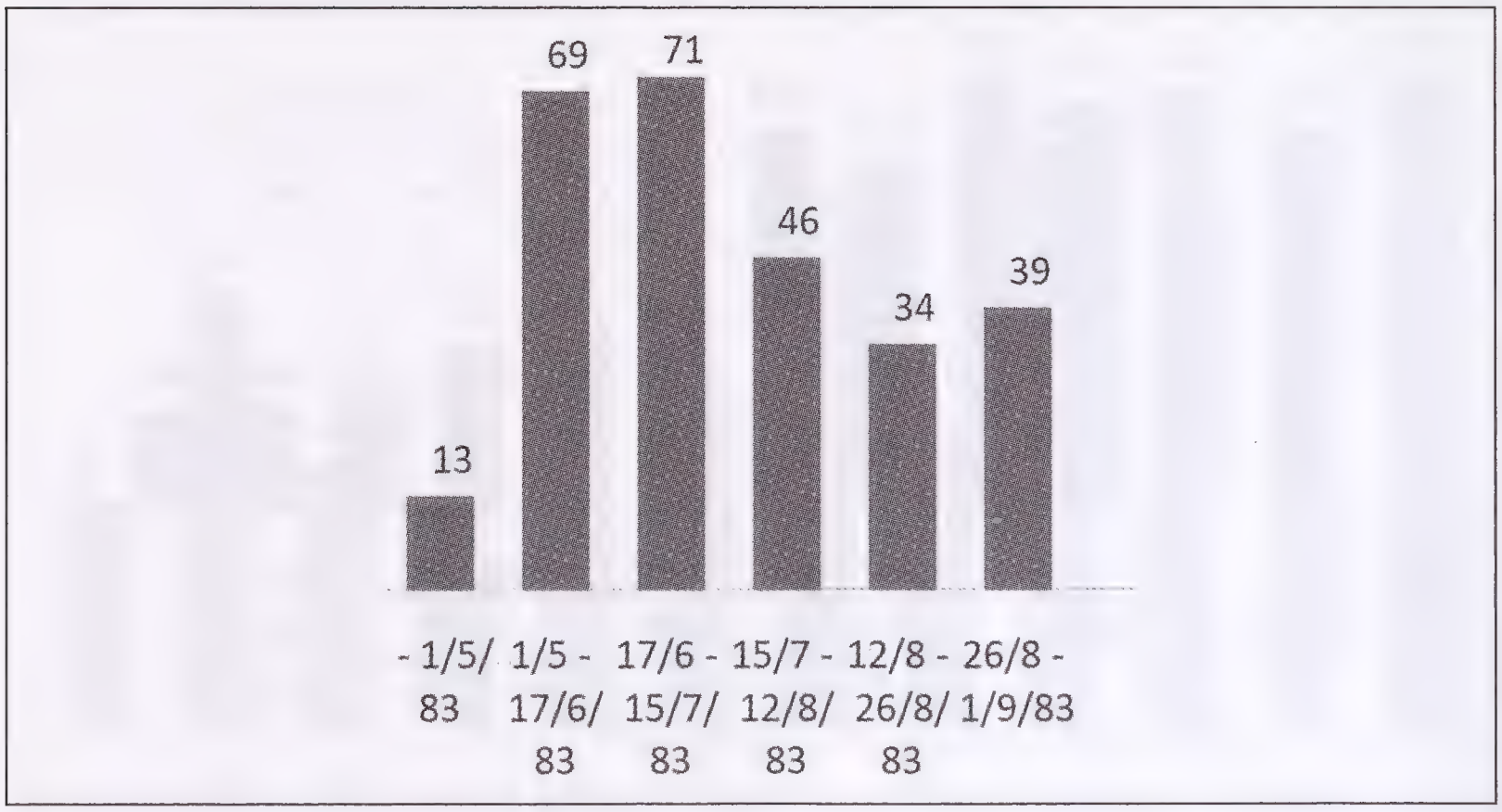

Fig. 7. Numbers of Coleoptera species recorded at Parsonage Down NNR on each date of the ITE survey.

1,510 of the rove beetle *Sepedophilus marshami* (Stephens) and 2,456 of another rove beetle *Tachinus rufipes* (L.), but the ITE survey makes no mention of any of these except for one individual of *T. rufipes*. In the case of *Tachinus* this was the only example of the five species ITE trapped. A possible explanation might be provided by the different times of year when the traps were running, but in the case of *T. rufipes*, for example, all the captures during the recent survey were made during the same period that ITE was trapping. Have some species declined and others moved in and, if so, why? The questions are important but unfortunately the more recent data do not cover a sufficiently long period to be able to provide clear answers. *Silpha tristis* is a carrion feeder, *S. marshami* feeds on fungi and *T. rufipes* is an omnivore which gives some indication of the complexities involved. They do, however, point to the importance of continuing to run similar programmes on a more structured basis in the future.

The ITE survey recorded 58 species, and the recent survey 92 species represented by singletons. Ignoring those found in both surveys, 118 species were recorded from this one area of downland on the basis of single examples. Many of these species are of nationally notable status and some represent the only examples to have ever been recorded in the county. They may be residents at low population levels, not easy to sample or simply strays from other habitats. Further research is required to confirm their status.

Some omissions from both surveys are difficult to account for when they concern species recorded on other Wiltshire calcareous grassland sites. The Bombardier beetle, *Brachinus crepitans* (L.), for example, has been recorded extensively at Porton and on the Plain; the rare histerid *Onthophilus punctatus* (Müller) which inhabits mole's nests has been found on nearby Wylye Down; and *Orthochaetes setiger* (Beck), a small parthenogenetic flighless ground dwelling weevil associated particularly with calcareous grassland. Other omissions are much easier to account for because phytophagous beetles in particular are dependent on the presence of particular foodplants. *Cleopomiarus graminis* (Gyllenhal) for example, another calcareous grassland weevil found at Wylye feeds on clustered bellflower (*Campanula*

glomerata), a plant only found in one area of Castle Down and outside the sampling sites.

Two, much less rare species found commonly in surrounding areas, which one would have expected to have been picked up in one of the surveys are the Bloody-nosed beetle *Timarcha tenebricosa* (F.) and its close relative *Timarcha goettingensis* (L.).

Comparison with other reserves

The protocols involved in the Parsonage Down survey were deliberately chosen to match as closely as possible those of an earlier survey conducted on Wylye Down NNR a few miles to the west of Parsonage Down (Darby, 2009a). Here 7,101 individuals were trapped representing 202 species. As at Parsonage Down the commonest species was the rove beetle *Drusilla canaliculata*, (F.) but, unlike Parsonage Down, the ground beetle *Calathus fuscipes* (Goeze) and the rove beetle *Paederus littoralis* (Gravenhorst), the other very common species on Wylye, were recorded in proportionately lower numbers. This survey also produced a lower number of nationally rare and notable species.

No other pitfall trap surveys on calcareous grassland in Wiltshire have been carried out although L. Jones-Walters conducted a much smaller survey on Martin Down, Hampshire, which is included in Vice County 8, Wiltshire South (Jones-Walters, 1988). This was presumably the basis for the anonymous typescript report dated 1999 in Natural England's archives titled *Martin Down NNR Pitfall Trap Survey* indicating that 108 species were recorded of which eight were Nationally Notable. In another calcareous grassland survey also carried out by ITE at Old Winchester Hill, Hampshire and which is mentioned in Morris, Rispin and Snazell (1990), 66 fewer species than Parsonage Down were recorded but with a proportionately higher number of rare and notable species (45). That site is much smaller than Parsonage Down and on a fairly steep slope, and this figure was no doubt accounted for by the higher number of phytophagous species resulting from the presence of a different, taller flora.

Numbers trapped at different sites

Although the species numbers trapped at the four sites in the recent survey are broadly similar, this is not the case with sites 3 and 4 of the ITE survey which produced a considerably greater number of species than those trapped at sites 1 and 2, and 5 and 6. Sites 1 and 2 were situated on what is now used as back-up land. This was ploughed and re-sown for crop production during the last war but has since been left unimproved and is regarded as of value for the study of the re-colonisation of chalk grassland. Sites 5 and 6 appear to have been situated either in, or very close to, the scrub area at the north western area of the Down. Both situations, therefore, would not be expected to produce such high numbers as Old Down.

The large numbers of individuals in some families recorded in the pitfall traps at sites B and C of the recent survey reflect the nature of their situation which was very unusual on the reserve. The two parallel runs of pots were placed in a small area which had been fenced off several years earlier as part of a programme for monitoring Lepidoptera and later abandoned. Without grazing by cattle or other management it had developed into rough grassland dominated by large tussocks thus providing a habitat for species at ground level favouring a damper habitat and greater shelter. This influenced the numbers of Staphylinidae and Silphidae trapped in particular. Of the 1,512 specimens of *Silpha tristis* Illiger trapped overall, 1,397

were from this site; and 1505 out of 1,622 *Sepedophilus*; 2,372 out of 2,504 *Tachinus* and 422 out of 445 *Anthobium*. Also exceptional were the very large numbers of the minute featherwing beetle *Acrotrichis atomaria* (de Geer) found here. The greater number of individuals recorded, however, was not reflected in the numbers of species which were only 10–13 greater than the traps placed elsewhere on the reserve.

The flight interception traps at this location (listed as B/C in area A) were attached to the fencing adjacent to the reserve and produced a larger number both of individuals and species than those in A and D. This was almost certainly the result of the presence of taller local vegetation particularly umbellifers. Since the survey was carried out this fencing has been removed and the area has been incorporated into Old Down and grazed more heavily.

Rare and notable species

Twenty-two of the rare and notable species on the ITE lists were not found in the recent survey. None of these are included in the list of determinations made by Martin Luff. Collecting techniques not used in this survey – the use of a D-Vac, for example – and different locations and dates of collection no doubt account for some of these omissions, but there must be concern about several of the others for which little or no data are provided, in particular all of the five RDB1 species and six of the Notable and Na species. All of these are 'difficult' species to identify. Of the Notable and Na species *Liocyrtusa minuta* (Ahrens) is found on coastal and pasture woodland sites, *Oligota apicata* (Erichson) and *Neuraphes plicicollis* Reitter are broad leaved woodland species, and *Philonthus atratus* (Gravenhorst) is known only from wetlands. Of the five RDB1 species the jewel beetle *Aphanisticus emarginatus* (Olivier) is a woodland, wetland and river margin species associated with rushes and sedges and not recorded in Britain since 1951, and *Leiodes longipes* (Schmidt) is known mostly from sandy soils as is *Medon castaneous* (Gravenhorst). Perhaps the most questionable record is that of the flea beetle *Longitarsus aeruginosus* (Foudras), another coastal (and river bank) species with only two records from Britain (Isle of Wight and Dorset coast) the last being in 1925. All four of these RDB1 species were listed as Na in 1990 (Hyman, 1986; Shirt, 1987). The cryptophagid *Atomaria rubricollis* Brisout de Barneville, now listed as RDB1 had no rarity listing in 1983 when recorded by ITE, and was considered doubtful by Ed Rispin who had placed a question mark against this species on his list.

Included amongst the insects about which there should be little concern over identification is the RDB longhorn beetle *Paracorymbia fulva* (De Geer), found quite commonly in Wiltshire in recent years but rare elsewhere in the UK. That it is found almost exclusively in grassland habitats such as Parsonage Down indicates that breeding probably takes place underground in the roots of plants or in fungi, rather than in timber as has been previously suggested (Darby, 1997). Of the less rare species it was pleasing to find adults of the jewel beetle *Agrilus sinuatus* (Olivier) in numbers by beating hawthorns on the scrub area of Castle Down. Most of the earlier records of this species in the county had been from the characteristic burrows left by the larvae under bark.

Calcareous Grassland Quality Index (CGQI)

The CGQI for Parsonage Down was 312 based on 32 contributing species scoring a total of 100. The only other site to have been assessed with a similar number of contributing species is Porton Down which scored a CGQI of 348 from 35 species.

This site is situated in both Hampshire and Wiltshire and assigning many records to one or other county is not possible. Porton Down is a much larger area of downland than Parsonage Down with a mix of other habitats and thus likely to achieve a higher score.

Alexander (2003) lists 250 beetles which, in his view, are strongly associated with, and dependent upon, lowland calcareous grassland so that the comparatively low number of these specific species found on Parsonage Down, Porton and the other Wiltshire sites appears to downgrade their importance nationally. However, the presence of a small number of high value species such as *Licinus depressus* (Paykull) and *Cassida prasina* Illiger, suggests otherwise. Alexander's list includes many species not found during the surveys which have a close association with plants known to occur at Parsonage Down. More specifically focussed recording might therefore have picked up some of these species. But, perhaps more importantly, his findings are not confined specifically to short sward grassland like that at Parsonage Down, but to more generalised calcareous grassland including, for example, luxuriant flowerings of tall plants in habitat situations such as bare earth, disturbed ground and sea-cliffs. A stricter comparison and ranking of the importance of sites should therefore be made by comparing chalk downlands of similar floristic composition rather than the full range of chalkland types. He also makes clear that his list is provisional and subject to change in the future.

Winter species

The winter activities of the British Coleoptera remain a relatively little explored subject so that the records from Parsonage Down add useful data. Adults of more than 30 species were recorded as active in January 2010, for example, even though the site was under snow and ice for much of the time. Staphylinidae and Leiodidae were particularly prominent in this group, some species such as *Choleva jeanneli* Britten and *Nargus wilkini* (Spence) apparently being confined to this time of year whereas others such *Anotylus sculpturatus* (Gravenhorst) and *Quedius tristis,* sens. auct., were recorded almost as commonly during winter as in the summer months. Lower numbers of trapped individuals are to be expected during winter months simply because mobility (and thus to a degree trappability) is directly linked to temperature and that many species are in quiescent stages and so not liable to be trapped.

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References

Alexander, K. N. A. 2003. A review of the invertebrates associated with lowland calcareous grassland. *English Nature Research Report* No. **512**. 1–109.

Alexander, K. N. A. 2004. Revision of the Index of Ecological Continuity as used for saproxylic beetles. *English Nature Report* No. **574**.

Clarke, S. 1997. *Badger Survey*. Typescript dissertation at the Reserve office.

Darby, M. 1997. *Leptura fulva* Deg. in Wiltshire. *Recording Wiltshire* **2**: 10–11. Wiltshire and Swindon Biological Recording Centre, Devizes.

Darby, M. 2009a. *Wiltshire Beetles. History, Status, Distribution and Use in Site Assessment*, Sutton Mandeville, Malthouse Books. 1–345.

Darby, M. 2009b.The Beetles of Wylye Down National Nature Reserve. *Wiltshire Studies* **102**: 1–11.

Darby, M. 2014. Pitfall trap surveys of beetles in Langley Wood National Nature Reserve, Wiltshire, *British Journal of Entomology and Natural History* **27**: 27–43.

Duff, A. G. (ed.) 2012. *Checklist of Beetles of the British Isles, 2nd edition*. Iver, Pemberley Books Publishing. 1–171.

Hyman, P. S. 1986. *A National Review of British Coleoptera. 1a. A review of the statuses of British Coleoptera* (*in taxonomic order*). Invertebrate Site Register report no. 64. Nature Conservancy Council, unpublished.

Hyman, P. S., revised by Parsons, M. S. 1992. *A review of the scarce and threatened Coleoptera of Great Britain. Part 1*. UK Joint Nature Conservation Committee, Peterborough.

Hyman, P. S., revised by Parsons, M. S. 1994. *A review of the scarce and threatened Coleoptera of Great Britain. Part 2*. UK Joint Nature Conservation Committee, Peterborough.

Jones-Walters, L. 1988. *The management of chalk grassland for the conservation of invertebrate populations, with special reference to Martin Down and Aston Rowant National Nature Reserves*. Nature Conservancy Council Report.

Luff, M. L. 1996. Environmental Assessments using Ground Beetles (Carabidae) and Pitfall Traps, in Eyre, M.D. (ed) 1996, *Environmental Monitoring, Surveillance and Conservation using Invertebrates*, EMS publications, 42–47.

Morris, M. G. 1974. A Preliminary Account of the Weevils of Wiltshire (Coleoptera, Curculionoidea). *Wiltshire Archaeological and Natural History Society Magazine* **68–69**: 19–24, 30–38.

Morris, M. G. 1979. Wiltshire Weevils (Coleoptera, Curculionoidea) Additions and Corrections. *Wiltshire Archaeological and Natural History Society Magazine* **74**: 10–12.

Morris, M. G., Rispin, W. E. & Snazell, R. G. 1990. *Invertebrate Assessment of Intensively-studied NNRs* (*Old Winchester Hill and Parsonage Down*), Institute of Terrestrial Ecology (Natural Environment Research Council) Project T 09 056 15 NCC (South Region)/NERC Contract Report to Nature Conservancy Council (South Region). Typescript.

Rodwell, J. S. 1992. *British Plant Communities, 3 Grasslands and Montane Communities*. Cambridge University Press.

Shirt, D. B. (ed.) 1987. *British Red Data Books: 2. Insects*. Peterborough, Nature Conservancy Council.

Appendix. The Coleoptera of Parsonage Down National Nature Reserve

Dates given are when the traps were put down. The species names and generic order are as in Duff (2012) although an alphabetical sequence has been followed within genera. RDB, Na, Nb and Notable classifications are from Hyman & Parsons (1992, 1994). The trap sites are as shown on the map Fig.1; B/C represents the location of flight interception traps placed on fencing at sites B and C. CDS = Castle Down scrub area. CGQI = Calcareous Grassland Quality Index; scores from Darby (2009b). ? = species recorded in ITE lists but without data. ?(ML) = determinations by Martin Luff of species not recorded in ITE lists. MGM = M.G.Morris. ?(MRS) = species listed without data in Morris, Rispin & Snazell (1990). Frequency comments by MGM: C = common; A = abundant; VC = very common; VA = very abundant; NR = not recorded. Some attempt has been made for the date range figures to include gaps, i.e. over the winter months, but more detailed information is available from the author if required. The questionable determination of some ITE species is discussed in the main text.

Taxon	Author	Status	Trap site	MD nos	MD dates	ITE nos	ITE dates, etc.
CARABIDAE							
Abax parallelepipedus	(Pill. & Mitt.)		A,B,C,D	9	1 May–30 Sep 09		
Agonum marginatum	(L.)		4			1	15-Jul-83
Amara aenea	(De Geer)		3,4,5,A,B,C,D	14	8 Apr–2 Sep 09	8	17 Jun–26 Aug 83
Amara communis	(Panzer)		3,6,A,B,C,D	16	16 Mar–27 Jul 09	4	15 Jul–12 Aug 83
Amara convexior	Stephens		A,B,C,D	17	16 Mar–2 Sep 09		?(ML)
Amara eurynota	(Panzer)		B	1	28 May 09		?(MRS)
Amara familiaris	(Duftschmid)		D	1	16 Mar 09		?(MRS)
Amara lunicollis	Schiödte		3,4			6	12 Aug–1 Sep 83
Amara montivaga	Sturm		B	1	28 May 09		
Amara ovata	(F.)		3,4			7	12 Aug 83
Amara plebeja	(Gyll.)		3,4,5			5	17 Jun–15 Jul 83
Amara similata	(Gyll.)		4			1	17 Jun 83
Anchomenus dorsalis	(Pontoppidan)		A,B,C,D	17	8 Apr–27 Jul 09		
Badister bullatus	(Schrank)		2,5,A,B,C,D	14	1 May–27 Jul 09	3	17 Jun–15 Jul 83
Bembidion guttula	(F.)		B/C	1	16 Mar 09		
Bembidion lampros	(Herbst)		3,4,A	1	01 May 09	4	17 Jun–1 Sep 83
Bembidion lunulatum	(Geoff.)		NR			?	?(MRS)
Bembidion obtusum	Audinet-Serville		5,B,C	4	8 Apr–3 Dec 09	1	12 Aug 83
Bembidion quadrimaculatum	(L.)		C	1	27 Jul 09		

continued

Taxon	Author	Status	Trap site	MD nos	MD dates	ITE nos	ITE dates, etc.
Calathus fuscipes	(Goeze)		1,2,3,4,5,6,A,B,C,D	546	16 Mar–30 Sep 09, 16 Feb–17Mar 10	509	15 Jul–1 Sep 83
Calathus melanocephalus	(L.)		1,2,3,4,5,6,A,B,C,D	110	8 Apr–3 Dec 09	26	17 Jun–1 Sep 83
Calodromius spilotus	(Illiger)		NR	2	2–22 Jul 08		
Carabus monilis	F.	CGQI-2	5,6,B,D	2	28 May & 2 Sep 09	11	17 Jun–1 Sep 83
Carabus nemoralis	Muller		NR				?(ML)
Carabus problematicus	Herbst		D	1	28 May 09		
Carabus violaceus	L.		3,4,5,6,A,B,C,D	177	1 May–27 Jul 09	33	15 Jul–1 Sep 83
Curtonotus aulicus	(Panzer)		1,3,4,5,6,A,B/C,C,D	21	28 May–2 Sep 09	26	15 Jul–1 Sep 83
Demetrias atricapillus	(L.)		B/C	1	16 Mar 09		
Harpalus affinis	(Schrank)		NR				?(MRS)
Harpalus latus	(L.)		3,4,5,6,A,C,D	10	8 Apr–30 Sep 09	13	15 Jul–1 Sep 83
Harpalus rufipes	(De Geer)		2,3,4,5,A,B,B/C,C,D	155	8 Apr–27 Jul 09	22	17 Jun–1 Sep 83
Laemostenus terricola	(Herbst)		1,A,D	2	2–30 Sep 09	1	01 Sep 83
Leistus ferrugineus	(L.)		A,B,C,D	16	8 Apr–29 Oct 09. 20 Jan 10		
Leistus fulvibarbis	Dejean		B	1	28 May 09		
Leistus spinibarbis	(F.)		B	1	01 May 09		
Licinus depressus	(Paykull)	Nb, CGQI-6	A,C,D	13	1 May–30 Sep 09		?(MRS)
Loricera pilicornis	(F.)		A,B,C,D	7	16 Mar 09. 2 Sep 09		
Nebria brevicollis	(F.)		A,B,C,D	144	8 Apr–3 Dec 09		?(MRS)
Notiophilus biguttatus	(F.)		A,D	6	1–28 May 09. 16 Feb–17 Mar 10		
Notiophilus palustris	(Duftschmid)		B	1	25 Jun 09		
Notiophilus substriatus	Waterhouse		A,D	4	16 Mar 09. 16 Feb–17 Mar 10		
Olisthopus rotundatus	(Paykull)		NR				?(MRS)
Ophonus puncticeps	Stephens		D	1	27 Jul 09		
Ophonus schaubergerianus	(Puel)	Nb	C	2	28 May 09		
Panagaeus bipustulatus	(F.)	Nb, CGQI-3	B,C,D	45	1 May–2 Sep 09		
Paradromius linearis	(Oliv.)		D	1	16 Mar 09		
Patrobus atrorufus	(Strom)		NR				?(MRS)
Poecilus cupreus	(L.)		1,5,A,D	4	16 Mar–17 Jun 09	2	17–Jun-83

Taxon	Author	Status	Trap site	MD nos	MD dates	ITE nos	ITE dates, etc.
Poecilus versicolor	(Sturm)		A,C,D	31	8 Apr–2 Sep 09		
Pterostichus madidus	(F.)		1,2,3,4,5,A,B,C,D	471	8 Apr–29 Oct 09	176	17 Jun–26 Aug 83
Pterostichus melanarius	(Illiger)		1,2,3,4,5,A,B,B/C,C,D	1190	8 Apr–30 Sep 09	532	17 Jun–1 Sep 83
Pterostichus niger	(Schaller)		A,B,C,D	419	1 May–30 Sep 09		
Pterostichus strenuus	(Panzer)		C	3	16 Mar & 30 Sep 09		
Stomis pumicatus	(Panzer)		3,4,6,B,C,D	20	8 Apr–29 Oct 09	3	15 Jul–12 Aug 83
Syntomus foveatus	(Geoff.)		B,C	68	16 Mar–29 Oct 09. 20 Jan–17 Mar 10		?(MRS)
Synuchus vivalis	(Panzer)		A,C,D	11	25 Jun–2 Sep 09		?(MRS)
Trechus quadristriatus	(Schrank)		2,A,B,B/C,C,D	26	25 Jun–3 Dec 09. 20 Jan 10	1	01 Sep 83
HELOPHORIDAE							
Helophorus rufipes	(Bosc d'Antic)		NR				?(MRS)
HYDROPHILIDAE							
Cercyon analis	(Paykull)		NR				?(ML)
Cercyon impressus	(Sturm)		4,5,6,A,B	2	1–28 May 09	5	15 Jul 83
Cercyon nigriceps	(Marsham)	Notable	5			1	15 Jul 83
Cercyon haemorrhoidalis	(F.)		A,B,C	8	25 Jun–30 Sep 09		
Cercyon impressus	(Sturm)		NR				?(ML)
Cercyon lateralis	(Marsham)		A	1	25 Jun 09		
Cercyon melanocephalus	(L.)		3,A	3	1 May–25 Jun 09	2	15 Jul 83
Cercyon pygmaeus	(Illiger)		6,A	4	1 May–27 Jul 09	1	15 Jul 83
Cercyon unipunctatus	(L.)		A	1	29 Oct 09		
Cryptopleurum minutum	(F.)		5			1	15 Jul 83
Megasternum concinnum	(Marsham)		3,4,5,6,A,B,B/C,D	1377	8 Apr 09–16 Feb–17 Mar 10	10	17 Jun–1 Sep 83
Sphaeridium lunatum	F.		3,4,5			17	17 Jun–12 Aug 83
Sphaeridium scarabaeoides	(L.)		1,3,4,6			11	15 Jul–26 Aug 83
HISTERIDAE			NR				
Hister unicolor	L.		3,4,5			4	15 Jul–12 Aug 83
Kissister minimus	(Aubé)		A,B,B/C,C,D	79	16 Mar–3 Dec 09, 16 Feb–17 Mar 10		
Margarinotus purpurascens	(Herbst)		B,C	2	1–28 May 09		

continued

Taxon	Author	Status	Trap site	MD nos	MD dates	ITE nos	ITE dates, etc.
Margarinotus ventralis	(Marseul)		A,B	5	8 Apr–28 May 09		
Onthophilus striatus	(Forster)		B,C	5	1–28 May, 30 Sep 09		
Paralister ventralis	Marseul		D	1	27 Jul 09		
PTILIIDAE							
Acrotrichis atomaria	(De Geer)		A,B,B/C,C,D	299	1 May–29 Oct 09		?(MRS)
Acrotrichis fascicularis	(Herbst)		B/C	1	01 May 09		?(MRS)
Acrotrichis grandicollis	(Mann.)		B/C	1	27 Jul 09		?(MRS)
Oligella foveolata	(Allibert)	Notable	A	1	27 Jul 09	1	10 Aug 83 (ML)
Ptenidium formicetorum	Kraatz		B/C	1	25 Jun 09		
Ptenidium pusillum	(Gyll.)		A,B,B/C,C	14	1 May–30 Sep 09		
LEIODIDAE							
Agathidium atrum	(Paykull)		B	3	1 May–27 Jul 09		
Agathidium laevigatum	Erichson		B,C	13	27 Jul–2 Sep 09		
Agathidium marginatum	Sturm	Notable	4,5,B	1	28-May 09	2	15 Jul–1 Sep 83
Agathidium varians	Beck		NR				?(ML)
Catops chrysomeloides	(Panzer)		CDS trap site B/C	1	16-Mar 09		
Catops fuliginosus	Erichson		B,C,D	289	16 Mar–3 Dec 09, 20 Jan–17 Mar 10		
Catops grandicollis	Erichson		B	25	30 Sep–29 Oct 09		?(ML)
Catops kirbii	(Spence)		B,C,D	4	02-Sep 09		
Catops morio	(F.)		B,C,D	53	8 Apr–27 Jul 09		
Choleva angustata	(F.)		A,C	4	27 Jul–3 Dec 09		
Choleva fagniezi	Jeannel		B,C,D	17	8 Apr–3 Dec 09, 20 Jan–17 Mar 10		
Choleva jeanneli	Britten		B,C,D	9	16 Mar 09, 20 Jan 10		
Choleva oblonga	Latreille		B,C,D	26	16 Mar–8 Apr, 29 Oct–3 Dec 09, 20 Jan–17 Mar 10		
Leiodes longipes	(Schmidt)	RDB1	NR				?(MRS)
Leiodes obesa (dubia)	(Schmidt)		1,3			2	17 Jun 83
Leiodes rufipennis	(Paykull)		NR				?(MRS)
Liocyrtusa minuta	(Ahrens)	Notable	1,3,4,5			9	17 Jun–12 Aug 83

PLATE 1. Fig. 1. A pair of *Agonoscena targionii* adults. Figs 2 & 3. Mid-to-late instar nymphs of *A. targionii*. Fig. 4. Leaf rolls on *Pistacia lentiscus* caused by *A. targionii*. Fig. 5. A typical infestation of *Agonoscena targionii* on *Pistacia lentiscus* showing wax-covered nymphs. Two scale insects, probably *Saissetia oleae* (Olivier) also present. Eden Project Biome, Cornwall, 2013–2014. Photos: Sally Luker.

PLATE 2. Parsonage Down National Nature Reserve, Wiltshire, 2009. Fig. 1. A general view with chalk downland in foreground, looking west. Fig. 2. Scrub area part of Castle Down. Figs 3 & 4. Location of pitfall trap lines A and D. Photos: Michael Darby.

PLATE 3. Fig. 1. An adult 5-spot Ladybird *Coccinella quinquepunctata* with aphid in mouth scurrying across the shingle by the edge of the River Dee, adjacent to Peterculter Golf Course, Aberdeenshire May, 2014. Fig. 2. *Coccinella quinquepunctata* habitat by the River Dee, adjacent to Peterculter Golf Course, Aberdeenshire, May, 2014. Note the scattered plants of tansy *Tanacetum vulgare* and ribwort plantain *Plantago lanceolata* growing among the cobbles of the exposed shingle bed. Photos: Nick Littlewood.

PLATE 4. Fig. 1. The shore bug collecting area in New Marston Meadows, Oxford (17 June 2014). Photo R. Ryan. Fig. 2. *Saldula opacula* (Zetterstedt) and its county distribution (Ryan, 2014b).

Taxon	Author	Status	Trap site	MD nos	MD dates	ITE nos	ITE dates, etc.
Nargus velox	(Spence)		B,C,D	428	8 Apr–1 May, 2 Sep–3 Dec 09, 20 Jan–17 Mar 10		
Nargus wilkinii	(Spence)		B,C,D	18	16 Mar 09, 16 Feb–17 Mar 10		
Ptomaphagus medius	Rey		1,2,3,4,5,A,B,B/C,C,D	24	16 Mar–1 May 09	53	17 Jun–1 Sep 83
Ptomaphagus subvillosus	(Goeze)		1,2,3,4,5,6,A,B,C,D	257	8 Apr–27 Jul 09, 16 Feb–17 Mar 10	78	17 Jun–1 Sep 83
Ptomaphagus varicornis	(Rosenhauer)	RDBK, CGQI-2	B,C	23	8 Apr & 30 Sep 09		
Sciodrepoides watsoni	(Spence)		B,B/C,C	38	1 May–25 Jun 09		
Sogda suturalis	(Zett.)		NR				?(ER)
SILPHIDAE							
Nicrophorus humator	(Gleditsch)		5,B	1	28 May 09	1	26 Aug 83
Nicrophorus interruptus	Stephens	Nb	B	1	27 Jul 09		?(ML)
Nicrophorus investigator	Zetterstedt		B	1	01 May 09		?(ML)
Nicrophorus vespillo	(L.)		5,6,B.C	8	28 May 09	3	26 Aug 83
Nicrophorus vespilloides	Herbst		B,C	5	28 May–27 Jul 09		
Silpha atrata	L.		CDS, A,B,B/C,C,D	142	16 Mar–29 Jul 09		
Silpha laevigata	F.	CGQI-1	5			3	17 Jun 83
Silpha tristis	Illiger	CGQI-3	A,B,C,D	1512	8 Apr–29 Oct 09		
Thanatophilus rugosus	(L.)		B	12	28 May–25 Jun 09		
Thanatophilus sinuatus	(F.)		1	2	28 May–25 Jun 09	9	12 Aug 83
STAPHYLINIDAE							
Acidota cruentata	Mann.	Nb	C	2	03 Dec 09		
Acrolocha sulcula	(Stephens)		NR				?(MRS)
Acrotona aterrima	(Gravenhorst)		B/C	6	27 Jul 09		
Alaobia scapularis	(Sahlberg)		NR				?(MRS)
Aleochara bipustulata	(L.)		NR				?(MRS)
Aleochara curtula	(Goeze)		1,6,B,C	7	28 May–26 Aug 09	2	12–26 Aug 83
Aleochara intricata	Mann.		1			4	17 Jun–26 Aug 83
Aleochara lanuginosa	Gravenhorst		5,A,B,B/C,C,D	8	1 May–25 Jun 09	1	15 Jul 83

continued

Taxon	Author	Status	Trap site	MD nos	MD dates	ITE nos	ITE dates, etc.
Aleochara lata	Gravenhorst		A	1	01 May 09		
Aloconota gregaria	(Erichson)		5			1	15 Jul 83
Aloconota longicollis	Muls. & Rey)		NR				?(MRS)
Amischa analis	(Gravenhorst)		1,2,3,4,5,6,A,B/C,C,D	8	8 Apr–27 Jul 09	55	17 Jun–1 Sep 83
Amischa bifoveolata	(Mann.)		1,3,4,5,A,B/C,D	6	25 Jun–27 Jul 09	11	1 May–1 Sep 83
Amischa decipiens	(Sharp)		1			1	15 Jul 83
Amischa forcipata	Mulsant & Rey		3			1	01 May 83
Anotylus inustus	(Gravenhorst)		1,2,3,4,5,6,A,B,B/C,C,D	100	8 Apr 09–17 Mar 10	134	17 Jun–1 Sep 83
Anotylus nitidulus	(Gravenhorst)		A	9	28 May 09		
Anotylus rugosus	(F.)		B,C	25	8 Apr–30 Sep 09		
Anotylus sculpturatus	(Gravenhorst)		1,2,4,5,6,A,B/C,D	104	16 Mar 09–20 Jan 10	46	15 Jul 83
Anotylus tetracarinatus	(Block)		1,2,4,5,A,B/C,C,D	48	8 Apr–25 Jun 09	34	1 May–15 Jul 83
Anthobium atrocephalum	(Gyll.)		B	2	16 Mar 09 & 20 Jan 10		
Anthobium unicolor	(Marsham)		B,C	445	8 Apr–1 May, 30 Sep–3 Dec 09, 20 Jan–17 Mar 10		
Atheta brunneipennis	(Thomson C.G.)		B,C	26	8 Apr–27 Jul 09		
Atheta triangulum	(Kraatz)		NR				?(MRS)
Atheta xanthopus	(Thomson C.G.)		B/C	1	08 Apr 09		
Autalia rivularis	(Gravenhorst)		5,A.B/C	2	1 May–25 Jun 09	1	15 Jul 83
Bessobia excellens	(Kraatz)		NR				?(MRS)
Bisnius fimetarius	(Gravenhorst)		A,B	2	28 May & 29 Oct 09		
Bisnius sordidus	(Gravenhorst)		B/C	2	16 Mar–28 May 09		
Bolitobius castaneus	(Stephens)		B	2	16 Mar–8 Apr 09		?(ML)
Callicerus obscurus	Gravenhorst		B,C	7	28 May 09. 20 Jan–16 Feb 10		
Cypha longicornis	(Paykull)		5,6			6	17 Jun–15 Jul 83
Datomicra sordidula	(Erichson)		B/C	1	27 Jul 09		
Dimetrota atramentaria	(Gyll.)		A	1	27 Jul 09		
Dinaraea angustula	(Gyll.)		NR				?(MRS)
Drusilla canaliculata	(F.)		1,2,3,4,5,A,B,C,D	2830	16 Mar–29 Oct 09	150	1 May–1 Sep 83
Encephalus complicans	Stephens		C,D		28 May–27 Jul 09		

Taxon	Author	Status	Trap site	MD nos	MD dates	ITE nos	ITE dates, etc.
Geostiba circellaris	(Gravenhorst)		NR				?(MRS)
Gyrohypnus punctulatus	(Paykull)		5			3	15 Jul 83
Heterothops niger	Kraatz		A,B	2	16 Mar 09		
Ilyobates propinquus	(Aubé)	Notable	D	1	28 May 09		?(MRS)
Ischnosoma splendidum	(Gravenhorst)		B/C,D	1	1 May, 27 Jul 09		
Lamprinodes saginatus	(Gravenhorst)	Na	B/C	1	01 May 09		
Lathrobium geminum	Kraatz		NR				?(MRS)
Lathrobium longulum	Gravenhorst		C	1	08 Apr 09		
Medon castaneus	(Gravenhorst)	RDB1	NR				?(MRS)
Megalinus glabratus	(Gravenhorst)		A,B,B/C	14	28 May–3 Dec 09		?(ML)
Megarthrus depressus	sensu auctt.		3			1	12 Aug 83
Metopsia clypeata	(Müller P.W.J.)		B,C	18	1 May 09, 27 Jul 09–17 Mar 10		
Microdota inquinula	(Gravenhorst)	Notable	A,B/C		1 May–27 Jul 09		
Micropeplus fulvus	Erichson		A	1	29 Oct 09		
Micropeplus staphylinoides	(Marsham)		A,B,C,D	328	16 Mar 09–17 Mar 10		?(ER)
Mocyta amplicollis	(Mulsant & Rey)		CDS	3	22 Jul 08		
Mocyta fungi	(Gravenhorst)		4			5	17 Jun–1 Sep 83
Mocyta fungi agg.			A,B,B/C,C,D	684	8 Apr–3 Dec 09		
?Mocyta orphana	(Erichson)	Notable	6			1	15 Jul 83
Mycetoporus clavicornis	(Stephens)		A	1	25 Jun 09		
Mycetoporus nigricollis	Stephens		D	1	16 Mar 09		
Neuraphes plicicollis	Reitter	Notable	NR				?(MRS)
Neuraphes talparum	Lokay		NR				5 Jul 83 (ML)
Ocypus aeneocephalus	(De Geer)		1,3,4,5,6,A,B,D	66	16 Mar–30 Sep 09, 20 Jan–17 Mar 10	45	17 Jun–1 Sep 83
Ocypus fortunatarum	(Wollaston)	Nb	A,B	5	8 Apr, 2 Sep 09, 20 Jan 10		
Ocypus olens	(Müller O.F.)		A,B,C,D	51	8 Apr–30 Sep 09		?(MRS)
Oligota apicata	(Erichson)	Notable	NR				?(MRS)
Omalium caesum	Gravenhorst		A,B,C,D	49	16 Mar–1 May, 30 Sep 09–20 Jan 10		
Omalium oxyacanthae	Gravenhorst		A	1	29 Oct 09		

continued

Taxon	Author	Status	Trap site	MD nos	MD dates	ITE nos	ITE dates, etc.
Ontholestes murinus	(L.)		B,C	5	25 Jun–30 Sep 09		
Othius laeviusculus	Stephens		A,B/C,C,D	7	16 Mar–28 May 09		?(MRS)
Othius subuliformis	Stephens		1,A,C,D	5	16 Mar–29 Oct 09, 16 Feb–17 Mar 10	1	15 Jul 83
Othius punctulatus	(Goeze)		B,C,	61	16 Mar 09–17 Mar 10		
Oxypoda brachyptera	(Stephens)		1,2,3,4,5			6	1 May–15 Jul 83
Oxypoda longipes	Mulsant & Rey		A,B,C	1	8 Apr & 27 Jul 09	3	
Oxpoda nigricornis	Mots.	Nb	NR				?(MRS)
Oxypoda opaca	(Gravenhorst)		A,D	4	1 May–25 Jun 09		
Oxyporus rufus	(L.)		D	1	27 Jul 09		
Oxytelus laqueatus	(Marsham)		6			1	26 Aug 83
Paederus littoralis	Gravenhorst		1,2,4,5,6,A,B,B/C,C,D	75	16 Mar–17 Mar 10	18	17 Jun–1 Sep 83
Pella limbata	(Paykull)		B,C,D	8	16 Mar–25 Jun 09		
Philhygra palustris	(Kies.)		2,3			2	15 Jul–12 Aug 83
Philonthus atratus	(Gravenhorst)	Na	NR				?(MRS)
Philonthus carbonarius	(Gravenhorst)		1,2,3,4,5,6			21	17 Jun–1 Sep 83
Philonthus cognatus	Stephens		1,2,3,4,5,6,A,B,C,D	75	8 Apr–25 Jun 09	164	17 Jun–1 Sep 83
Philonthus concinnus	(Gravenhorst)		A	3	1–28 May 09		
Philonthus ebeninus	(Gravenhorst)	Notable	A	1	02 Sep 09		
Philonthus intermedius	(Lacordaire)		NR				?(MRS)
Philonthus laminatus	(Creutzer)		5,A,B,B/C,C	16	16 Mar–25 Jun 09	2	15 Jul 83
Philonthus marginatus	(Müller O.F.)		A,B,C	5	25 Jun–27 Jul 09		
? Philonthus nitidicollis	(Bois. & Lac.)	Nb	1			1	17 Jun 83
Philonthus sanguinolentus	(Gravenhorst)		5			1	15 Jul 83
Philonthus splendens	(F.)		3,5,B/C,C	3	16 Mar–3 May 09	4	15 Jul–12 Aug 83
Philonthus varians	(Paykull)		1,5,A,B,D	5	28 May–27 Jul 09	4	15 Jul 83
Philonthus varius	(Gyll.)		NR				
Plataraea brunnea	(F.)		5			8	17 Jun–1 Sep 83
Platydracus stercorarius	(Oliv.)		2,3,4,5,6,C,D	9	25 Jun–2 Sep 09	16	15 Jul–1 Sep 83
Platystethus arenarius	(Fourc.)		CDS,5,6,A	3	2 Jul 08, 1 May–15 Jul 09	4	15 Jul 83
Platystethus nitens	(Sahlberg)		NR				?(MRS)

Taxon	Author	Status	Trap site	MD nos	MD dates	ITE nos	ITE dates, etc.
Proteinus ovalis	Stephens		CDS	1	29 Oct 09		
Quedius fulgidus	(F.)		NR				?(MRS)
Quedius fuliginosus	(Gravenhorst)		A,B,C,D	39	16 Mar–27 Jul 09, 17 Mar 10		
Quedius invreae	Gridelli	Nb	D	1	01 May 09		
Quedius levicollis	(Brulle)		NR				?(ML)
Quedius molochinus	(Gravenhorst)		B,B/C/C,D	51	8 Apr–30 Sep 09		
Quedius persimilis	(Mulsant & Rey)		B/C,C,D	4	8 Apr–27 Jul 09		
Quedius picipes	(Mann.)		A,B,C,D	166	16 Mar–29 Oct 09		
Quedius schatzmayri	Gridelli		B	4	27 Jul–2 Sep 09		?(MRS)
Quedius scintillans	(Gravenhorst)		B,C	6	8 Apr–2 Sep 09		
Quedius semiaeneus	(Stephens)		B,B/C,C,D	7	28 May & 2 Sep–29 Oct 09		?(MRS)
Quedius semiobscurus	(Marsham)		A,B,B/C,C,D	23	28 May–3 Dec 09		?(MRS)
Quedius levicollis	(Brulle)		5,A,B,C,D	77	28 May 09–20 Jan 10	1	26 Aug 83
Rugilus orbiculatus	(Paykull)		B/C,C,D	4	28 May–30 Sep 09		
Rugilus rufipes	Germar		B,C,D	29	8 Apr–29 Oct 09		
Rugilus similis	(Erichson)	Notable, CGQI-2	B,C,D	21	8 Apr–30 Sep 09		
Scaphisoma agaricinum	(L.)		D	1	28 May 09		
Sepedophilus immaculatus	(Stephens)	CGQI-2	B	2	28 May & 27 Jul 09		
Sepedophilus marshami	(Stephens)	CGQI-2	B,B/C,C,D	1510	16 Mar–3 Dec 09		
Sepedophilus nigripennis	(Stephens)		B,C,D	110	16 Mar 09–17 Mar 10		
Stenichnus collaris	(Müller & Kunze)		CDS, B,B/C	5	2 Jul 08, 1 May–2 Sep 09, 17 Mar 10		
Stenus aceris	Stephens		B,C	13	8 Apr, 30 Sep 09 -16 Feb 10		
Stenus brunnipes	Stephens		2,3,4,5,6,D	5	25 Jun–30 Sep 09	26	1 May–1 Sep 83
Stenus clavicornis	(Scop.)		A,B,C,D	31	8 Apr–30 Sep 09		?(MRS)
Stenus fulvicornis	Stephens		D	2	28 May 09		
Stenus nanus	Stephens		1,2			3	15 Jul–1 Sep 83
Stenus ossium	Stephens		B,C	42	16 Mar, 30 Sep–17 Mar 10		
Sunius melanocephalus	(F.)	Notable	5,6,D	3	16 Mar–25 Jun 09	7	1 May–1 Sep 83
Sunius propinquus	B. de Barneville		NR			1	5 Jun 83

continued

Taxon	Author	Status	Trap site	MD nos	MD dates	ITE nos	ITE dates, etc.
Tachinus humeralis	Gravenhorst		D	1	29 Oct 09		
Tachinus laticollis	Gravenhorst		B	10	25 Jun–27 Jul 09		
Tachinus marginellus	(F.)		A,B,C,D	31	30 Sep 09–17 Mar 10		
Tachinus pallipes	(Gravenhorst)		B,B/C	4	16 Mar 09		
Tachinus rufipes	(L.)		4,A,B,B/C,C,D	2456	8 Apr–29 Oct 09, 16 Feb–17 Mar 10	1	26 Aug 83
Tachinus subterraneus	(L.)		D	2	29 Oct–3 Dec 09		
Tachyporus atriceps	Stephens		4,D	4	16 Mar–1 May 09	1	15 Jul 83
Tachyporus chrysomelinus	(L.)		1,3,4,5,6,A,B/C,D	19	8 Apr–26 Aug 09	15	1 May–1 Sep 83
Tachyporus hypnorum	(F.)		1,2,3,4,5,6,A,B,C,D	27	8 Apr–3 Dec 09	69	1 May–1 Sep 83
Tachyporus nitidulus	(F.)		2,3,4,6,AB/C,C,D	18	16 Mar–30 Sep 09, 16 Feb–17 Mar 10	6	17 Jun 83
Tachyporus pusillus	Gravenhorst		1,2,3,4,5,6			76	1 May–1 Sep 83
Tachyporus solutus	Erichson		NR				?(MRS)
Tachyporus tersus	Erichson		A	2	16 Mar 09		
Tasgius globulifer	(Geoffroy)		B,C,D	32	16 Mar–30 Sep 09, 16 Feb–17 Mar 10		
Tasgius morsitans	(Rossi)		B,C,D	7	16 Mar, 27 Jul–30 Sep 09		
Tasgius winkleri	Bernhauer		B,C,D	24	8 Apr–28 May, 2 Sep 09–17 Mar 10		
Tinotus morion	(Gravenhorst)		A	1	25 Jun 09		
Xantholinus elegans	(Oliv.)		B,C	42	1 May–27 Jul 09		
Xantholinus longiventris	Heer		6,B,C	2	08 Apr 09	1	01 Sep 83
GEOTRUPIDAE							
Geotrupes spiniger	(Marsham)		5			1	26 Aug 83
Odonteus armiger	(Scop.)	Na	3,5			2	17 Jun–15 Jul 83
SCARABAEIDAE							
Amphimallon solstitiale	(L.)		A	2	25 Jun 09		
Aphodius ater	(De Geer)		4,5,6,A	5	1–28 May 09	32	17 Jun–15 Jul 83
Aphodius borealis	Gyll.		A	1	28 May 09		
Aphodius coenosus	(Panzer)	Nb	1,4,5			7	15 Jul 83
Aphodius contaminatus	(Herbst)		3			1	01 Sep 83

Taxon	Author	Status	Trap site	MD nos	MD dates	ITE nos	ITE dates, etc.
Aphodius erraticus	(L.)		2,3			3	17 Jun–12 Aug 83
Aphodius fimetarius	(L.)		3,5,D	1	01 May 09	5	15 Jul–1 Sep 83, 20 Feb 98(BG)
Aphodius fossor	(L.)		2,3,5,B	1	28 May 09	8	15 Jul–12 Aug 83
Aphodius haemorrhoidalis	(L.)		3			1	15 Jul-83
Aphodius luridus	(F.)		3,5,A	1	28 May 09	3	15 Jul-83
Aphodius prodromus	(Brahm)		5	2	25 Jun–2 Sep 09	2	15 Jul-83
Aphodius rufipes	(L.)		1,3,5,A			4	15 Jul–1 Sep 83
Aphodius rufus	(Moll)		NR				?(MRS)
Aphodius sphacelatus	(Panzer)		B/C,C	3	16 Mar–28 May 09		
Omaloplia ruricola	(F.)	Nb, CGQI-6	2,A	1	25 Jun 09	1	12 Aug 83
Onthophagus coenobita	(Herbst)		C	1	30 Sep 09		
Phyllopertha horticola	(L.)		A,B,B/C,D	61	1 May–28 May 09		
Serica brunnea	(L.)		4,5,6			3	15 Jul–12 Aug 83
CLAMBIDAE							
Clambus armadillo	(De Geer)		1,D	1	16 Mar 09	1	15 Jul 83
DASCILLIDAE							
Dascillus cervinus	(L.)	CGQI-5	CGQI-2	4	28 May–17 Jun 09	4	15 Jul 83
BUPRESTIDAE							
Aphanisticus emarginatus	(Oliv.)	RDB1	6			1	12 Aug 83
Aphanisticus pusillus	(Oliv.)	Nb, CGQI-5	3,5,6			7	17 Jun–12 Aug 83
Trachys troglodytes	Gyll.	CGQI-5	D	1	28 May 09		?(MRS)
BYRRHIDAE							
Byrrhus pilula	(L.)		1,3,5			7	17 Jun–15 Jul 83
Simplocaria semistriata	(F.)		D	1	20 Jan 10		
ELATERIDAE							
Agriotes lineatus	(L.)		1,A	14	16 Mar–1 May 09	12	17 Jun–15 Jul 83
Agriotes obscurus	(L.)		A,B,C,D	17	16 Mar–25 Jun 09		?(MRS)
Agriotes sordidus	(Illiger)	RDB3	C	7	28 May 09		

continued

Taxon	Author	Status	Trap site	MD nos	MD dates	ITE nos	ITE dates, etc.
Agriotes sputator	(L.)		1,3,4,5,6,A,B,D	29	16 Mar–28 May 09	118	17 Jun–15 Jul 83
Agrypnus murinus	(L.)	CGQI-5	3,4,5,6,A,B,C,D	13	28 May–27 Jul 09	27	17 Jun–12 Aug 83
Athous bicolor	(Goeze)		CDS, 1,3,5,6,A,B/C,D	8	2 22 Jul 08, 28 May–25 Jun 09		?(MRS)
Athous campyloides	Newman	Na	NR				?(MRS)
Athous haemorrhoidalis	(F.)		3,4,5,6,B/C,C,D	7	16 Mar–28 May 09	29	17 Jun–15 Jul 83
Athous hirtus	(Herbst)		B/C,D	5	28 May–25 Jun 09		
Athous vittatus	(F.)		D	2	28-May 09		
Cidnopus aeruginosus	(Oliv.)		3			1	17 Jun 83
Hemicrepidius hirtus	(Herbst)		CDS	2	02 Jul 08		
Kibunea minuta	(L.)		B,B/C,C,D	14	8 Apr–25 Jun 09		
CANTHARIDAE							
Cantharis figurata	Mann.		B/C	2	28-May 09		
Cantharis livida	L.		CDS trap site D	2	1–28 May 09		
Cantharis nigricans	(Müller O.F.)		A,B/C,C	18	1–28 May 09		
Cantharis rustica	Fallén		A,B,B/C,C,D	19	1–28 May 09		?(MRS)
Malthinus balteatus	Suffrian	Nb	CDS	1	22 Jul 08		
Malthinus seriepunctatus	Kiesenwetter		CDS	1	02 Jul 08		
Rhagonycha fulva	(Scop.)		B,C,B/C,D	225	25 Jun–30 Sep 09		
Rhagonycha limbata	Thomson C.G.		B/C	7	1 May–28 May 09		
Rhagonycha translucida	(Krynicki)	Nb	B/C	2	1 May–28 May 09		
PTINIDAE							
Ptinus tectus	Boieldieu		6			3	01 Sep 83
MALACHIDAE							
Cordylepherus viridis	(F.)		B/C,C	2	28 May 09		
KATERETIDAE							
Brachypterus glaber	(Newman)		B/C	11	1 May–27 Jul 09		
Brachypterus urticae	(F.)		B/C	1	01 May 09		
NITIDULIDAE							
Glischrocilus hortensis	(Geoff.)		NR				
Meligethes aeneus	(F.)		1,2,4,5,6,A,B/C,D	9	16 Mar–27 Jul 09	9	15 Jul–12 Aug 83
Meligethes kunzei	Erichson		CDS trap site B/C	1	01 May 09		

Taxon	Author	Status	Trap site	MD nos	MD dates	ITE nos	ITE dates, etc.
Meligethes nigrescens	Stephens		B/C	6	1 May–27 Jul 09		
Meligethes ovatus	Sturm		B/C	4	16 Mar–27 Jul 09		
Pocadius ferrugineus	(F.)		B,B/C,C	6	1–28 May 09		
MONOTOMIDAE							
Monotoma brevicollis	Aube		NR				?(MRS)
PHALACRIDAE							
Olibrus liquidus	Erichson		NR				?(MRS)
Stilbus testaceus	(Panzer)		4			1	12 Aug 83
CRYPTOPHAGIDAE							
Atomaria atricapilla	Stephens		1,2,3,5,6,B/C,D	4	1 May–25 Jun 09	21	17 Jun–12 Aug 83
Atomaria fuscata	(Schönherr)		2			1	17 Jun 83
Atomaria linearis	Stephens		4			1	15 Jul 83
Atomaria nitidula	(Marsham)		A,B/C	3	16 Mar–8 Apr 09		
?Atomaria rubricollis	B. de Barneville	RDB1	NR				?(ER)
Atomaria testacea	Stephens		2,5,6,A,B/C,D	3	1 May–27 Jul 09	11	15 Jul 83
Micrambe ulicis	(Stephens)		CDS	3	22 Jul 08		
BYTURIDAE							
Byturus tomentosus	(De Geer)		NR	1	22 Jul 08		
COCCINELLIDAE							
Coccinella septempunctata	L.		CDS & 2	5	28 May–27 Jul 09	3	12 Aug 83
Exochomus quadripustulatus	(L.)		CDS	1	08 Jul 08		
Halyzia sedecimguttata	(L.)		CDS	1	08 Jul 08		
Propylea 14punctata	(L.)		6			1	12 Aug 83
Psyllobora vigintiduopunctata	(L.)		B/C	1	27 Jul 09		
Scymnus schmidti	Fursch	Nb, CGQI-2	B/C	1	25 Jun 09		?(MRS)
Subcoccinella 24punctata	(L.)		B,B/C	7	1 May–2 Sep 09		
Tytthaspis sedecimpunctata	(L.)		D	2	27 Jul 09		
LATRIDIIDAE							
Corticaria elongata	(Gyll.)		B/C	1	27 Jul 09		
Corticarina minuta	(F.)		1,2,3,4,5,6	7		57	15 Jul–1 Sep 83

continued

Taxon	Author	Status	Trap site	MD nos	MD dates	ITE nos	ITE dates, etc.
Cortinicara gibbosa	(Herbst)		CDS,2,3,5		02-Jul-08	5	15 Jul–1 Sep 83
Enicmus histrio	Joy & Tomlin		NR				?(ML)
Enicmus transversus	(Oliv.)		2,3,5,6			10	17 Jun–1 Sep 83
CIIDAE			NR				
Octotemnus glabriculus	(Gyll.)		B	1	25 Jun 09		
MORDELLIDAE							
Variimorda villosa	(Schrank)	Nb	CDS	1	02 Jul 08		
TENEBRIONIDAE							
Isomira murina	(L.)		B/C	1	28 May 09		
Lagria hirta	(L.)		B	1	25 Jun 09		
OEDEMERIDAE							
Oedemera lurida	(Marsham)		B/C	1	25 Jun 09		
Oedemera nobilis	(Scop.)		CDS, B/C	6	28 May–2 Jul 09		
ANTHICIDAE							
Omonadus floralis	(L.)		A	1	16 Mar 09		
SCRAPTIIDAE							
Anaspis maculata	(Geoffroy)		CDS	1	02 Jul 08		
Anaspis pulicaria	Costa A.		CDS	1	02 Jul 08		
CERAMBYCIDAE							
Agapanthia villosoviridescens	(De Geer)		B/C	3	1 May–25 Jun 09		
Paracorymbia fulva	(De Geer)	RDB3	B/C	2	28 May–27 Jul 09		
Stenurella melanura	(L.)		CDS trap site B/C	1	28 May 09		
Tetrops praeustus	(L.)		CDS	2	02 Jul 08		
CHRYSOMELIDAE							
Altica oleracea	(L.)		1,2,3,5,6			20	17 Jun–1 Sep 83
Altica helianthemi	(Allard)		NR				?(MRS)
Altica palustris	Weise		NR				?(ER)
Aphthona ?atratula (atrovirens)	Allard	Nb	NR				?(MRS)
Aphthona euphorbiae	(Schrank)		A	3	16 Mar 09		
Cassida prasina	Illiger	Nb, CGQI-6	3,4			2	17 Jun 83

Taxon	Author	Status	Trap site	MD nos	MD dates	ITE nos	ITE dates, etc.
Cassida rubiginosa	Müller O.F.		5,6,D	1	01 May 09	2	17 Jun–15 Jul 83
Chaetocnema concinna	(Marsham)		5			2	17 Jun 83
Chaetocnema hortensis	(Fourcroy)		1,2,3,4,5,6			42	15 Jul–1 Sep 83
Chrysolina banksii	(F.)		D	1	30 Sep 09		
Chrysolina polita	(L.)		B	2	01 May 09	1	14 May 2010 (MGM)
Derocrepis rufipes	(L.)		CDS	1	02 Jul 08		
Longitarsus aeruginosus	(Foudras)	RDB1	4			1	12 Aug 83
Longitarsus atricillus	(L.)		1,2,3,4,5			102	17 Jun–1 Sep 83
Longitarsus dorsalis	(F.)	Nb, CGQI-3	A,D	3	16 Mar–1 May 09		
Longitarsus flavicornis	(Stephens)		4,5,6			5	15 Jul–1 Sep 83
Longitarsus gracilis	Kutschera		3			2	1 May&12 Aug 83
Longitarsus luridus	(Scop.)		1,2,3,4,5,6			196	17 Jun–1 Sep 83
Longitarsus melanocephalus	(De Geer)		1,2,3,4,5,6			31	1 May–1 Sep 83
Longitarsus parvulus	(Paykull)	Na	D	1	16 Mar 09		
?Longitarsus pellucidus	(Foudras)		NR				?(ER)
Longitarsus pratensis	(Panzer)		1,2,3,4,5,6			4379	1 May–1 Sep 83
Longitarsus rubiginosus	(Foudras)		4			1	12-Aug-83
?Longitarsus succineus	(Foudras)		NR				?(MRS)
Longitarsus suturellus	(Dufts.)		NR				?(ER)(MRS)
Neocrepidodera ferruginea	(Scop.)		CDS,4,6,A,B,B/C,C	15	28 May–27 Jul 09	3	15 Jul–1 Sep 83
Neocrepidodera transversa	(Marsham)		NR				?(MRS)
Phaedon tumidulus	(Germar)		C,D	2	16 Mar–8 Apr 09		
Phyllotreta nigripes	(F.)		5			1	17 Jun 83
Phyllotreta vittula	(Redtenbacher)		5			1	26-Aug 83
Psylliodes dulcamarae	(Koch J.D.W.)		D	1	16 Mar 09		
Sphaeroderma testaceum	(F.)		CDS & A	2	2–27 Jul 09		
RHYNCHITIDAE							
Tatianaerhynchites aequatus	(L.)		NR			S	14 May 2010 (MGM)

continued

Taxon	Author	Status	Trap site	MD nos	MD dates	ITE nos	ITE dates, etc.
Temnocerus longiceps	(Thomson)	Nb	CDS	1	02-Jul-08		
APIONIDAE							
Catapion seniculus	(Kirby W.)		2			38	1974 (MGM), 17 Jun–1 Sep 83
Ceratapion carduorum	(Kirby W.)		2			>6	14 May 2010 (MGM)
Ceratapion gibbirostre	(Gyllenhal)		NR			1	14 May 2010 (MGM)
Ceratapion lacertense	(Tottenham)		NR	10	22 Jul 08 .29 Oct 09		
Ceratapion onopordi	(Kirby W.)		NR			1	14 May 2010 (MGM)
Exapion ulicis	(Forster)		NR	6	02 Jul 08	A	14 May 2010 (MGM)
Hemitrichapion waltoni	(Stephens)		NR				?(MRS)
Holotrichapion ononis	(Kirby W.)		NR				1974 (MGM)
Holotrichapion pisi	(F.)		NR				?(MRS)
Ischnopterapion loti	(Kirby W.)		2			>17	17 Jun–1 Sep 83, 1974 (MGM)
Ischnopterapion virens	(Herbst)		5,A,D	8	1974. 16 Mar–1 May 09	2	15 Jul 83, 14 May 2010 (MGM)
Oxystoma cerdo	(Gerst.)		NR				
Oxystoma pomonae	(F.)		A,D	2	22 Jul 08. 25 Jun 09		
Perapion curtirostre	(Germar)		NR				?(MRS)
Perapion hydrolapathi	(Marsham)		NR			2	14 May 2010 (MGM)
Protapion apricans	(Herbst)		A	8	1974. 8–22 Jul 08. 8 Apr–1 May 09	>6	1974 (MGM), 15 Jul 83, 14 May 2010 (MGM)
Protapion assimile	(Kirby W.)		2			>11	1974 (MGM), 17 Jun–1 Sep 83

Taxon	Author	Status	Trap site	MD nos	MD dates	ITE nos	ITE dates, etc.
Protapion fulvipes	(Geoffroy)		1,2,3,4,5,6			24VA	1974 (MGM), 17 Jun–1 Sep 83, 14 May (MGM)
Protapion nigritarse	(Kirby W.)		B?C	1	01 May 09		?(MRS)
Protapion varipes	(Germar)	Nb	NR				1974 (MGM)
Protopirapion atratulum	(Germar)		NR	1	02 Jul 08	1	14 May 2010 (MGM)
Squamapion atomarium	(Kirby, W.)		1			1	01 Sep 83
Taeniapion urticarium	(Herbst)		B/C	2	01 May 09	1	14 May 2010 (MGM)
CURCULIONIDAE							
Graptus triguttatus	(F.)		D	5	16 Mar–28 May 09		
Anthonomus pedicularius	(L.)		CDS	4	22 Jul 08		
Barynotus obscurus	(F.)	CGQI-1	NR				?(MRS)
Ceutorhynchus obstrictus	(Marsham)		NR			1	14 May 2010 (MGM)
Ceutorhynchus pallidactylus	(Marsham)		5,A,B/C,D	5	28 May–27 Jul 09	1	17 Jun 83
Ceutorhynchus typhae	(Herbst)		NR			1	14 May 2010 (MGM)
Hadroplontus trimaculatus	(F.)	CGQI-3	NR			1	24 June 1995 (MGM)
Hylastes cunicularius	Erichson		NR				?(MRS)
Hypera nigrirostris	(F.)	CGQI-2	D	1	28 May 09		?(MRS)
Hypera plantaginis	(De Geer)	CGQI-2	4,5,D	2	16 Mar 09	5	17 Jun–12 Aug 83
Hypera zoiulus	(Scopoli)		A,B,D	5	16 Mar–1 May 09. 20 Jan 10		
Hypera venusta	(F.)	CGQI-2	CDS				1974 (MGM)
Magdalis barbicornis	(Latreille)	Na	CDS	1	02 Jul 08		
Mecinus pascuorum	(Gyll.)	CGQI-2	3,4,5,6			11	17 Jun–1 Sep 83
Mecinus pyraster	(Herbst)		5			1	17 Jun 83
Miarus campanulae	(L.)	CGQI-4	NR				?(ML)

continued

Taxon	Author	Status	Trap site	MD nos	MD dates	ITE nos	ITE dates, etc.
Nedyus quadrimaculatus	(L.)		B,B/C,C	7	8 Apr–25 Jun 09	C	14 May 2010 (MGM)
Neliocarus faber	(Herbst)	Nb, CGQI-4	CDS, 5			1	15 Jul 83
Orchestes fagi	(L.)		1			1	17 Jun 83
Otiorhynchus clavipes	(Bonsdorff)		A,B,B/C,C,D	7	8 Apr–28 May 09		?(MRS)
Otiorhynchus ligneus	(Oliv.)	CGQI-3	1,2,3,4,D	4	1 May–25 Jun 09	9	17 Jun–1 Sep 83
Parethelcus pollinarius	(Forster)		CDS, A,B	3	2 Jul 08 & 27 Jul 09	VC	14 May 2010 (MGM)
Phyllobius pyri	(L.)		CDS, B,C	4	1 May–2 Jul 08	C	14 May 2010 (MGM)
Phyllobius roboretanus	Gredler		A,B,B/C,D	13	1 May–25 Jul 09		?(MRS)
Phyllobius virideaeris	(Laicharting)	CGQI-2	5,B,C,D	4	28 May 09	1	17 Jun-83
Phyllobius viridicollis	(F.)	CGQI-3	B/C	1	01 May 09		
Pteleobius vittatus	(F.)		A	1	27 Jul 09		
Rhamphus oxyacanthae	(Marsham)		CDS	1	02 Jul 08		
Scolytus rugulosus	(Müller P.W.J.)		CDS	1	22 Jul 08		
Sitona hispidulus	(F.)		3,4,5,B/C,D	3	8 Apr–27 Jul 09	3	17 Jun–1 Sep 83
Sitona humeralis	Stephens		NR				?(MRS)
Sitona lepidus	Gyll.		3,4,5			4	17 Jun & 1 Sep 83
Sitona lineatus	(L.)		CDS,1,3,4,5,A,B/C,D	9	2 Jul 08, 16 Mar–27 Jul 09	4	1974 (MGM), 15 Jul–1 Sep 83
Sitona striatellus	Gyll.		CDS	1	02 Jul 08	1	14 May 2010 (MGM)
Sitona sulcifrons	(Thunberg)	CGQI-2	1,2,3,4,5,6			17	1974 (MGM), 17 Jun–1 Sep 83
Trachyphloeus alternans	Gyll.	Nb, CGQI-4	CDS, 3			1	12 Aug 83
Trichosirocalus troglodytes	(F.)		2,3,4,5,A,B/C	2	08 Apr 09	20	1 May–1 Sep 83
Tychius lineatulus	Stephens	Na, CGQI-1	CDS				1974 (MGM)
Tychius picirostris	(F.)		CDS,3,6	2	02 Jul 08	3	15 Jul–1 Sep 83
Tychius stephensi	Gyll.	CGQI-5	CDS,D	6	28 May–25 Jun 09		?(MRS)

ANTHRENUS (*ANTHRENUS*) *ANGUSTEFASCIATUS* (COLEOPTERA: DERMESTIDAE), A SPECIES NEW TO BRITAIN

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Abstract

An account of the discovery of a dermestid beetle new to Britain, *Anthrenus* (*A.*) *angustefasciatus* (Ganglebauer), is described. Three individuals were found on Oxeye daisy at Holme Green, Berkshire in May 2014. A brief description of the features separating *A. angustefasciatus* from *A. pimpinellae* (F.) is given. Morphological measurements of the specimens were taken and compared with similar measurements of *A. angustefasciatus* from the Mediterranean region. The possible modes of entry into the country are discussed along with the likelihood of finding further populations of *A. angustefasciatus* occurring in Britain.

Introduction

The family Dermestidae contains around 1200 species worldwide (Dermestidae World, 2012) but rather few of them exist in Britain. The Checklist of Beetles of the British Isles (Duff, 2012) contains 40 British species of Dermestidae, although probably fewer than 20 regularly occur outdoors in Britain. Several species of Dermestidae are closely associated with man as a result of their ability to feed on dried animal products such as hair, feathers, skin and meat. Some of the most familiar species fall within the genus *Anthrenus*. The species found regularly in Britain are: *A. verbasci* (L.), *A. fuscus* (Olivier), *A. museorum* (L.) and *A. sarnicus* (Mroczkowski). *Anthrenus verbasci*, the varied carpet beetle, is well known to many people as it breeds readily inside houses and other types of properties. The larvae feed on shed skin and hair to emerge as adults during the following spring and early summer. The emergent adults are frequently found on windows and windowsills attempting to escape outdoors to feed on pollen and nectar as a precursor to oviposition. Due to their ability to feed on dried animal products, *A. verbasci* is the scourge of museum collections worldwide, in particular those of natural history. *Anthrenus sarnicus* is another major pest species in museums and is expanding its range in Britain, but unlike *A.verbasci* it is only rarely found out-of-doors. *Anthrenus fuscus* is another common species that can be found in association with, but heavily outnumbered by, *A. verbasci*, often feeding on umbellifers and other spring flowers. The final species, *A. museorum*, is less frequently recorded in Britain.

On 19th May 2014 CWF collected three specimens of *Anthrenus* from a clump of Oxeye daisy (*Leucanthemum vulgare*) near Holme Green in Berkshire (SU828677, VC22). The insects did not belong to one of the species regularly recorded in the UK, so their identity was investigated.

Results and Discussion

Anthrenus is one of the bigger genera within the Dermestidae, totalling in excess of 220 species worldwide (Háva, 2003). Within the genus *Anthrenus*, four informal species complexes have been proposed: *flavipes, parvus, pimpinellae* and *scrophulariae* (Kadej, 2005). It was clear that the specimens found belonged to the *pimpinellae*

group, which is currently thought to contain 17 species plus one sub-species (Háva, 2007). These are listed in Table 1 (adapted from Kadej, Háva & Kalik, 2007). The group is characterised by the presence of a white, sub-basal elytral band, the shape and size of which can be a good diagnostic feature as it varies considerably among species. Two of the specimens discovered in the UK are shown in Figure 1. The white elytral band is evident, placing them within the *pimpinellae* complex. A second feature that can be useful in species diagnosis is the presence or absence of dark spots on the outer edges of the first sternite (Fig. 1). Kadej *et al.* (2007) note that *Anthrenus oceanicus* (Fauvel) has been recorded in the UK as an introduced species, though it is not on the British checklist (Duff, 2012). *Athrenus oceanicus* does indeed possess a broad elytral band but lacks the dark spots on the outer edge of sternite 1 (Kadej *et al.*, 2007). In fact, a further 15 species listed in Table 1 can be eliminated as candidates on the basis of inappropriate elytral colour pattern and/or lack of spots on sternite 1. Only two species, *A. angustefasciatus* (Ganglbauer) and *A. pimpinellae pimpinellae* (F.), possess both a clear white elytral band and black spots on the outer edge of sternite 1. Háva and Zahradnik (2011) provide a comparison of *A. angustefasciatus* with *A. pimpinellae*. The white elytral band on *A. angustefasciatus* is narrow and usually breached whilst in *A. pimpinellae* this band is broad and unbroken. The elytral band in the specimens shown in Figure 1 is not broad, particularly towards the elytral suture, and is broken. It is therefore concluded that the specimens in Figure 1 are thus *A. angustefasciatus*.

The body dimensions of the three specimens were as follows: body length (BL, clypeus to pygidium) and body width (BW), respectively: 3.55 mm and 2.5 mm, 3.7 mm and 2.5 mm, 2.6 mm and 1.85 mm. The values lie outside of the ranges recorded by Kadej *et al.* (2007), two being larger and one being smaller. Kadej *et al.* (2007) gathered their specimens from the Mediterranean. GJH collected five adult

Table 1. *Anthrenus* species belonging to the *pimpinellae* complex within the family Dermestidae and their global ranges (adapted from Kadej, Háva & Kalik, 2007).

Species	Natural Range
A. hoberlandti Kadej, 2007	Iran
A. similaris Kadej, 2007	Iran
A. warchalowskii Kadej, 2007	Iran
A. angustefasciatus Ganglbauer, 1904	Eastern Europe, Mediterranean
A. delicatus Kiesenwetter, 1951	Eastern Europe, Middle East, Mediterranean
A. dorsatus Mulsant et Roy, 1868	Southern Mediterranean
A. flavidulus Reitter, 1889	Middle East
A. goliath Saulcy in Mulsant et Roy, 1868	Eastern Europe, Mediterranean
A. indicus Kadej, Háva et Kalík, 2007	Northern India
A. latefasciatus Reitter, 1892	Middle East, China
A. mesopotamicus Háva, 2001	Middle East
A. mroczkowskii Kalík, 1954 stat. n.	Middle East, Eastern Mediterranean
A. munroi Hinton, 1943	Eastern Europe, Middle East, Mediterranean
A. nipponensis Kalík et Ohbayashi, 1985	Far eastern Palaearctic
A. oceanicus Fauvel, 1903	Indian subcontinent, Indonesia, China, Oceania
A. pfefferi Kalík, 1954	Crete and Greece
A. p. pimpinellae (Fabricius, 1775)	Nearly cosmopolitan
A. p. isabellinus Küster, 1848	Western Mediterranean

A. angustefasciatus from Majorca in 2012 on marguerites (*Leucanthemum* sp). The mean dimensions of these *A. angustefasciatus* were BL = 3.1 mm and BW = 2.3 mm, with one small individual falling outside the range recorded by Kadej *et al.* (2007). When back in the UK, the adult *A. angustefasciatus* from Majorca were placed on feathers and allowed to lay eggs. Thirteen F_1 developed into adult beetles with mean BL = 3.1 mm and mean BW = 2.4; three small individuals fell outside of the range reported by Kadej *et al.* (2007). Kadej *et al.* (2007) examined 100 examples from 'the Mediterranean' but it is not known from where in the Mediterranean region the specimens were collected. It is possible that there is size variation across the natural range of *A. angustefasciatus*, which accounts for the range of body sizes in the adults collected from Berkshire.

Anthrenus pimpinellae was last recorded in the UK in 1895 (Beaumont, 1895) and is referred to as a 'lost' species by Natural England (2010). However, in the nineteenth century the *A. pimpinellae* group was regarded as monospecific, so it is not clear whether Beaumont's record definitely concerns *Anthrenus pimpinellae pimpinellae*. *Anthrenus pimpinellae* ssp. *angustefasciatus* was described in 1904 but was not raised to species status until 2003 (Háva, 2003). The beetles from Beaumont's collections are held by Glasgow Museums, and contain two species labelled *A. pimpinellae*. Based on inspection of images, one is likely to be *Anthrenus pimpinellae pimpinellae* and the other resembles *Anthrenus delicatus* (Kiesenwetter), a widespread species with a mostly Mediterranean distribution. Neither has a traceable location label, and since they are of different species it seems unlikely that these are the British specimens of '*A. pimpinellae*' reared from a fallen maple branch by Beaumont (1895). In the absence of any further information the Berkshire specimens of *Anthrenus angustefasciatus* discussed here should therefore be regarded as the first recorded individuals of this species in the British Isles.

Unlike *A. verbasci* and *A. sarnicus*, *A. angustefasciatus* is not considered a significant pest in museum collections so is unlikely to have found its way into the UK on items transferred between museums. It might be associated with birds' nests

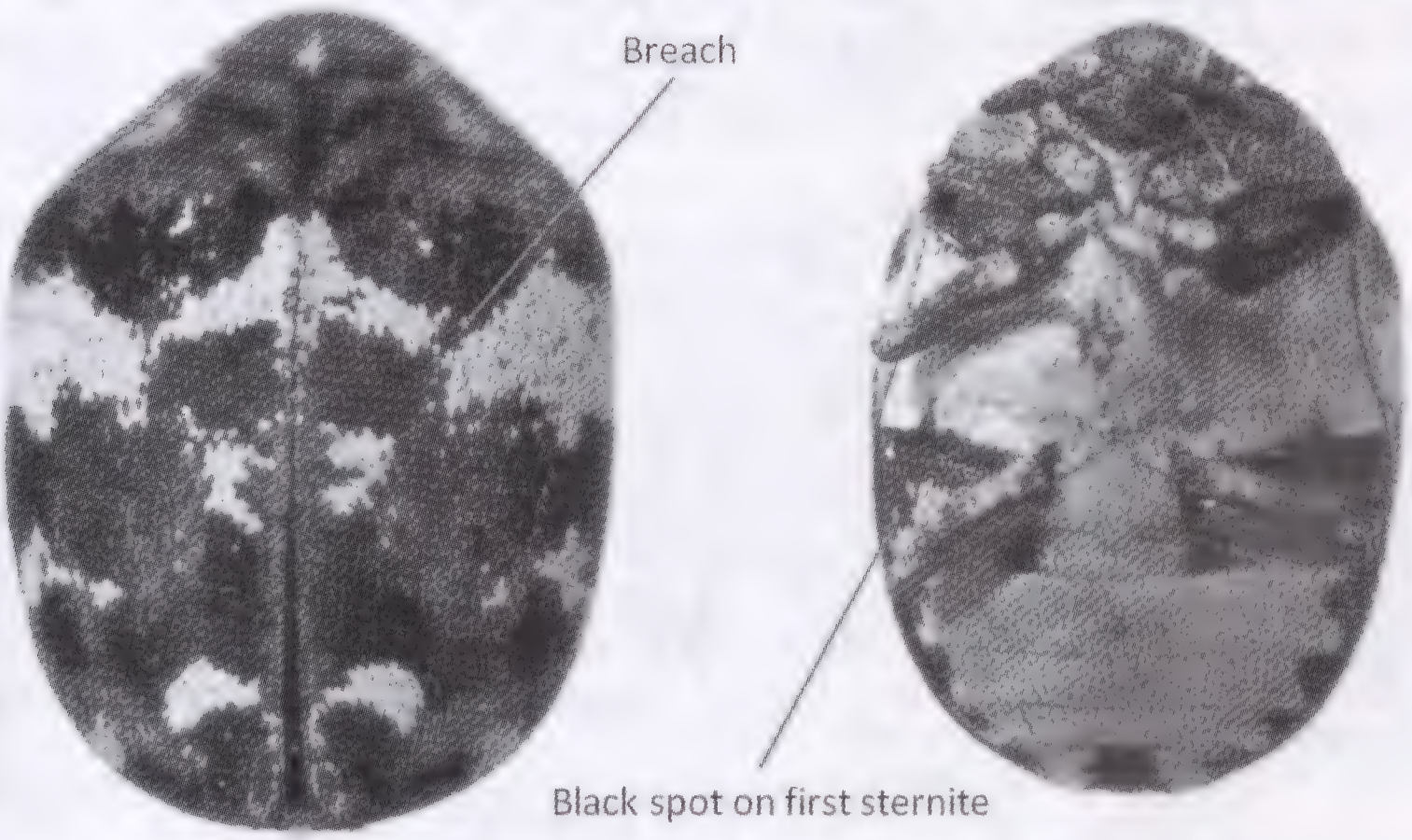

Fig. 1 *Anthrenus angustefasciatus* discovered in the UK on the 19th May 2014 at Holme Green, Berkshire (VC22). The breach in the white elytral band and the black lateral spot on sternite 1 (both illustrated) are useful identification features.

feeding on discarded feathers (the common name of *A. pimpinellae* is the 'Birds Nest Carpet Beetle') and one of us (GJH) has reared *A. angustefasciatus* from Majorca on feathers in enclosed laboratory conditions. *Anthrenus angustefasciatus* has recently been recorded from northern Italy and France (Nardi & Háva, 2013), the Czech Republic (Háva & Zahradnik, 2011), Switzerland (Hava, Herrmann & Kadej, 2013) and Germany (Hava & Herrmann, 2014). The current known distribution of *A. angustefasciatus* is shown in Figure 2. The recent records might suggest that *A. angustefasciatus* is extending its range. If *A. angustefasciatus* has spread north under its own volition and colonized the UK, it is possible that there are more individuals breeding in the UK since the site where it was found, Holme Green, Berkshire is 70km from the coast. Many dermestid species are synanthropic, extending their range via the activities of humans. For example, *A. pimpinellae* was first noticed in the US in 1984 (Hoebeke, Wheeler & Beal, 1985) and is now almost cosmopolitan despite being essentially a Palaearctic species. Presumably its propensity to being spread around the world is due to the ability that many Dermestidae have of subsisting on dry proteinaceous materials shipped between continents as stored product commodities. If *A. angustefasciatus* entered the UK this way, the collection point is a long way from the nearest possible port of entry. If the beetles found in Berkshire were introduced directly to the locale on imported materials, this is unlikely to have been a unique event. Further occurrences of *Anthrenus angustefasciatus* in the UK should be expected.

The National Dermestidae Recording Scheme is run through Biological Sciences at the University of Reading. Records should be submitted via iRecord with attached images for verification but GJH would be very happy to assist with identification of

Fig. 2 Current known distribution of *Anthrenus angustefasciatus*. ● = data from Kadej *et al.* (2007), ● = data published since Kadej *et al.* (2007), ● = additions from the current study.

material if required. We would be most grateful for specimens of any species of Dermestidae, not just *Anthrenus*, to be sent to GJH at the above address.

Acknowledgements

The authors wish to thank Jeanne Robinson (Curator of Entomology) and Richard Sutcliffe (Research Manager for Natural History), Glasgow Museums, Glasgow Life, for their kind assistance in investigating Beaumont's 1895 record of *A. pimpinellae*. Two anonymous referees made useful comments on the original submission.

References

Anonymous, 2011. *Lost Life: England's Lost and Threatened Species*. Natural England, Peterborough.

Beaumont, A. 1895. Insects bred from a dead branch of maple at Blackheath. *Entomologist's Monthly Magazine* **31**: 281.

Dermestidae World. 2012. *Introduction*. http://www.dermestidae.wz.cz/introduction.html

Duff, A. 2012. *Checklist of Beetles of the British Isles*. Pemberley Books, Iver.

Háva, J. 2003. World catalogue of the Dermestidae (Coleoptera). *Studie a zpravy oblastniho muzea Praha – vychod v Brandyse and Labem a Stare Boleslavi, Supplementum* **1**: 1–196.

Háva, J. 2007. Dermestidae. In Lobi, I. & Smetana, A. (eds): *Catalogue of Palaearctic Coleoptera, Volume 4. Elateroidea, Derodontoidea, Bostrichoidea, Lymexyloidea, Cleroidea, and Cucujoidea*. Apollo Books, Stenstrup.

Hava, J. & Herrmann, A. 2014. New Faunistic Records of Dermestidae (Coleoptera) – Part 10. *Mitteilungen des Internationalen Entomologischen Vereins* **39**: 1–10.

Hava, J., Herrmann, A. & Kadej, M. 2013. New faunistic records of Dermestidae (Coleoptera) – Part 7. *Arquivos Entomoloxicos* **8**: 135–140.

Háva, J. & Zahradnik, P. 2011. *Anthrenus (Anthrenus) angustefasciatus* Ganglbauer, 1904 (Coleoptera: Dermestidae), in the Czech Republic. *Elatidarium* **5**: 1–4.

Hoebeke, E. R., Wheeler, A. G. & Beal, R. S. 1985. *Anthrenus pimpinellae* F., a Palaearctic dermestid established in eastern North America (Coleoptera: Dermestidae). *Journal of the New York Entomological Society* **93**: 1216–1222.

Kadej, M. 2005. Morphological variability of *pimpinellae*-group (Coleoptera: Dermestidae: *Anthrenus*) with a key to identification. Part 1. *Polskie Pismo Entomologiczne* **74**: 117–135.

Kadej, M., Háva, J. & Kalik, V. 2007. Review of the *Anthrenus pimpinellae* species group from Palaearctic region (Coleoptera: Dermestidae: Anthrenini). *Genus* **18**: 721–750.

Nardi, G. & Háva, J. 2013. Italian Dermestidae: notes on some species and an updated checklist (Coleoptera). *Zookeys* **360**: 45–81.

SHORT COMMUNICATION

Further observations of some Cypress feeding Hemiptera. – I recently reported finding *Megacoelum beckeri* (Fieber) (Miridae) (Hemiptera) associated with cypress trees (Denton, 2011). Further records of this association were made in 2014, including records from North Hampshire (VC12) where adults were frequent on cypress in Aldershot Military Cemetery (SU8751) on 13th August, and Badshot Lea graveyard, Surrey (SU8648) on 15th August. Other cypress feeders at both sites included *Orthotylus junipericola* Linnavouri (Miridae), *Orsillus depressus* Dallas (Lygaeidae) and *Liguropia juniperi* (Lethierry) (Cicadellidae). The last was also taken in Oxfordshire (VC23) on 12th September, when I beat several adults from a cypress tree in the graveyard in Bampton, Oxfordshire (SP3103) the first for the county? – Jonty Denton, 31 Thorn Lane, Four Marks, Hants GU34 5BX.

References

Denton, J. S. 2011. *Megacoelom beckeri* (Fieber) (Hem.: Miridae) associated with Cypress trees. *British Journal of Entomology and Natural History* **24**: 216.

AN ENTOMOLOGICAL CLASSIC – THE POOTER OR INSECT ASPIRATOR

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I am sure that we can all remember our first encounter with that wonderful entomological device, 'The Pooter' and were probably all told to remember to "suck don't blow" and also to remember to suck from the right tube. Despite this sage advice I am also sure that most, if not all of us, have somehow managed at some time to end up with a mouthful of small insects.

So exactly what is a Pooter and when was it invented? I of course knew the answer to the first bit but had forgotten the answer to second (if I ever knew it). A quick Google search led me to this simple definition from http://brainsofsteel.co.uk/post.php?id=Looking-for-Life-in-Your-own-Back-Yard

"The pooter (sic – pedantically as it is named after a person so should be capitalised) *is said to get its wonderful name from William Poos an American entomologist active in the 1930s, it consists of a small transparent airtight vial with two tubes protruding. One tube is put in your mouth and the other acts as a vacuum that will suck up bugs safely without damaging them. There is an inherent risk of sucking a bug into your mouth but that is half the fun."*

Perhaps more authoritatively, The Oxford Dictionary online *"A bottle for collecting small insects and other invertebrates, having one tube through which they are sucked into the bottle and another, protected by muslin or gauze which is sucked".* They further add that the word originated in the 1930s and is said to be derived from the name of William Poos (1891–1987) an American entomologist. http://www.oxforddictionaries.com/definition/english/pooter

The Dictionary of Entomology (Gordh & Headrick, 2011) defines it as *"POOTER. Noun. A vernacular term coined by an English entomologist for an aspirating device used to collect small, highly mobile insects. Named in honor of F.W. Poos, an American entomologist who employed the device to collect Cicadellidae."*

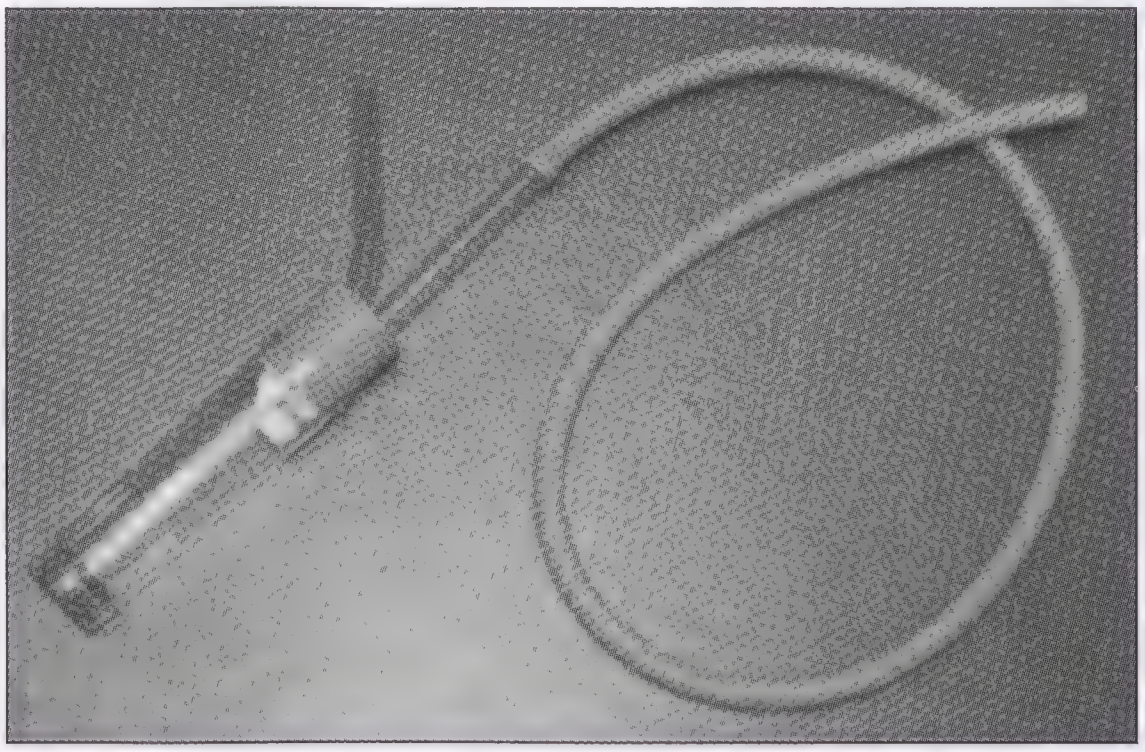


Fig. 1 The Pooter as I came across it first as a student – inherently simple but incredibly breakable http://svalbardinsects.net/index.php?id=33

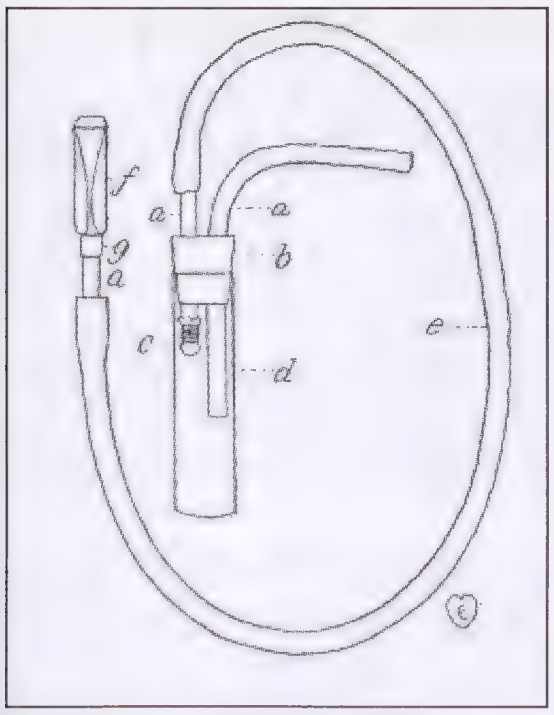


Fig. 2. The Poos Pooter (Poos, 1929). Reproduced with kind permission of the Entomological Society of America.

So it definitely seemed to appear that the Pooter was a relatively recent invention. Was this true or was it the entomological equivalent of an urban myth? After all, entomologists have been around a long time and it seemed odd that something as simple and as effective as a Pooter was less than an hundred year's old. I started with finding out a bit more about the putative inventor of the Pooter, F. W. Poos and found this also in the same source and after tracking down his obituary by (Wallenmaier, 1989) was rewarded with a photograph of the great man and the information that he was indeed credited as being the first person to use the Pooter.

Next I obtained Poos's 1929 paper in which he described the insect aspirator and sure enough there was a diagram of a Pooter pretty much as we know it today but with a cigarette holder as the mouthpiece.

In his paper Poos notes that his design is a modified version of the aspirators used by Kunkel (1926) and Severin & Swezy (1928). So how modified was his design and

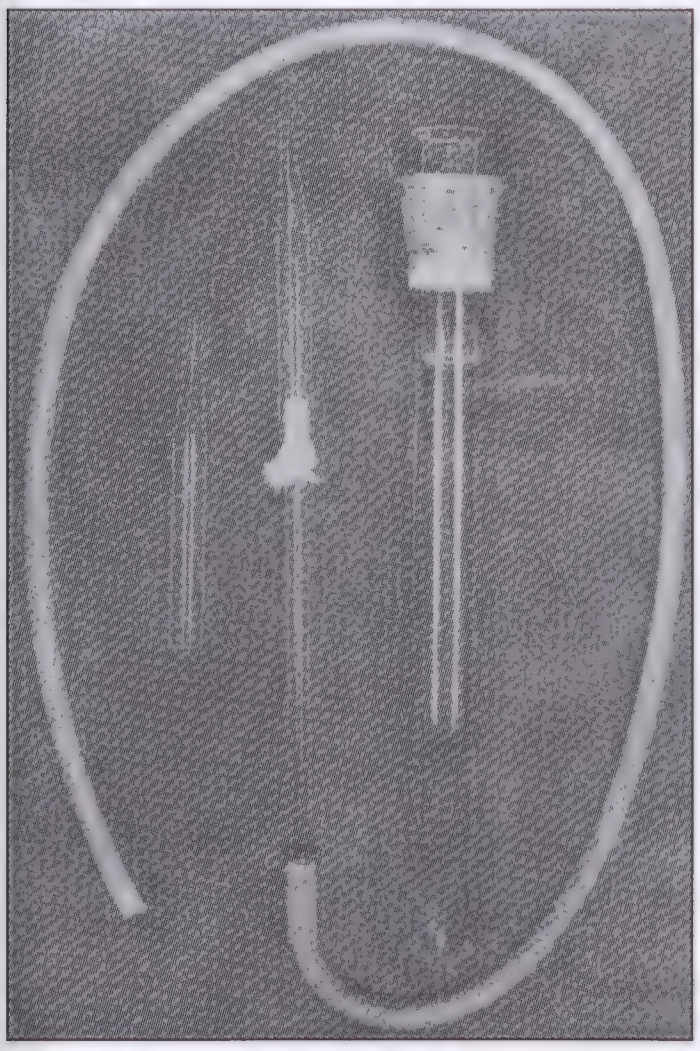


Fig. 3. The Kunkel insect aspirator – reproduced with kind permission of the Botanical Society of America.

should the Pooter really be called the Pooter? In the Severin and Swezy paper we are lucky enough to have a photograph of the insect aspirator in action and it is very obviously a straight line system as opposed to the two tubes going in at the top and the text explains that once caught the catch is tapped into another vial. So what about the earlier Kunkel paper? In this case the photograph clearly shows a sucking tube and another tube in which the catch is placed by blowing it out of the collecting tube; the Poos version is clearly a more efficient device as you suck and catch and can store your catches until a convenient moment arises for transfer to either your killing jar or observation chamber. As an undergraduate I briefly trailled a Pooter containing cherry laurel to make a combined catching and killing device; needless to say I very quickly decided that it was not a good idea.

The Pooter is thus distinct from the other devices in that the catch does not have to be transferred immediately to another container and that it has the sucking and catching ends coming out of the same aperture. Interestingly enough I did find an earlier description of an insect aspirator that had the same properties as the Pooter but was a straight line system (Buxton, 1928). So is the criterion for a Pooter the two tubes emanating from the same source? Apparently not, as if one turns to page 17 in that invaluable text, *Instructions for Collectors No. 4a* (Cogan & Smith, 1974) you will find illustrations of straight line aspirators described as pooters (*sic*).

Despite all my searching and a resort to Twitter, the earliest reference to an insect aspirator that I could find (many thanks to Richard Jones, pers. comm.) was 1868 (Ormerod, 1868 page 194) and is basically the same device as that described by Severin and Swezy in 1929.

So if we accept that the Pooter is the classic two tube sucker-storage version then yes, Poos invented the Pooter. If we contend that the Pooter is any old insect aspirator then it appears that Ormerod got there first and we should perhaps only be calling it a pooter because of the noise we make when aspirating an insect.

Two curiosities that I came across in my foray into the depths of insect aspirator history was a US patent filed in 1938 by a Clyde Barnhart (US Patent US2300765 A 1942) for an aspirator using a compressed air cylinder, designed to reduce wear and tear on the operator and a mechanical aspirator powered by a car engine (Moore, 1943).

Additional references to the use of insect aspirators can be found in an amusing and informative article published some thirty years ago (Fergusson, 1982).

References

Buxton, P. A. 1928. An aspirator for catching midges. *Transactions of the Royal Society of Tropical Medicine and Hygiene* **22**: 179–180.

Cogan, B. H. & Smith, K. G. V. 1974. *Instructions for Collectors No. 4a Insects*, British Museum (Natural History) London.

Fergusson, N. D. M. 1982. Pooter Post. *Antenna* **6**: 282–284.

Gibb, T. J. & Oseto, C. Y. 2006. *Arthropod Collection and Identification: Laboratory and Field Techniques*. Academic Press, New York.

Gordh, G. & Headrick, D. 2011. A *Dictionary of Entomology*, Second Edition, CABI, Wallingford 2011.

Kunkel, L. O. 1926. Studies on Aster Yellows. *American Journal of Botany* **13**: 646–705.

Moore, H. W. 1943. A mechanical aspirator for sorting and collecting insects in the field. *Canadian Entomologist* **75**: 162.

Omerod, E. L. 1868. *British Social Wasps*, Longmans & Co. London.

Poos, F. W. 1929. Leaf hopper injury to legumes. *Journal of Economic Entomology* **22**: 146–153.

Severin, H. P. & Swezy, O. 1928. Filtration experiments on curly top of sugar beets. *Phytopathology* **18**: 681–691.

Wallenmaier, T. E. 1989. Poos, Frederick, William – 1891–1987 – Obituary. *Proceedings of the Entomological Society of Washington* **91**: 298–301.

SHORT COMMUNICATIONS

Discovery of 5-spot Ladybird *Coccinella quinquepunctata* (L.) (Col.: Coccinellidae) along the River Dee, Aberdeenshire – The 5-spot Ladybird was thought to be extinct in the UK until its discovery in Wales in 1987 and rediscovery along the River Spey in Scotland the same year (Majerus & Fowles, 1989). Since then, in Scotland, the species has proved to be widespread within the Spey catchment and there have also been isolated records from the River Nairn, the River Glass and the Tay catchment (e.g. Goldie, 2013). Up to 2010, the UK Ladybird Recording Scheme held verified records from 39 hectads in Britain (Roy *et al.*, 2011).

The species occupies a quite specific habitat in the UK, being found on unstable shingle areas along rivers. Such areas exist along the River Dee in Aberdeenshire though, prior to 2014, there were no records from this catchment. Searches of likely-looking sites in spring 2009, 2012 and earlier in 2014 drew blanks, but I returned to a site near Peterculter on 17 May 2014 for another look. I spent some time tapping vegetation adjacent to open shingle, especially broom *Cytisus scoparius*, without success. I then tried turning stones within an area of sparsely vegetated shingle and, whilst doing this, noticed a ladybird running over the shingle which proved to be the target species (Plate 3, Figs 1 & 2). My search technique then changed to walking very slowly over shingle areas, looking down at the ground and, after half an hour, I had found a further three individuals.

Encouraged by this success, I used the same search technique at five further sites along the River Dee, over the next two weeks (Fig. 1). Sites were selected by reference

Fig. 1. *Coccinella quinquepunctata* habitat by the River Dee, Cults, Aberdeenshire, May 2014. Photo: Nick Littlewood.

Table 1. Sites on the River Dee, Aberdeenshire in May 2014 and the number of *Coccinella quinquepunctata* found per 30–45 min. search

Site name	Grid ref	Date visited	Quantity
Peterculter golf course	NO833986	17 May	4
Haugh of Ardoe, Cults	NJ897025	18 May	5
Birkenbaud, Crathes	NO727961	18 May	1
Waterside, Aboyne	NO535981	21 May	4
Near Park Bridge, Drumoak	NO801987	30 May	8
Pannanich, Ballater	NO386966	31 May	5

to online aerial photographs. Key features on the images included apparently bare shingle, interspersed with vegetated areas. At some sites there were successive strips of shingle and vegetation. Most sites were on the inside bend of a river meander. Each site was searched for around 30–45 minutes in dry, sunny conditions and *C. quinquepunctata* was found at all of them (Table 1). In the field, the most productive areas were not totally bare shingle, but shingle with very sparse vegetation. At these sites, large cobbles were 'set' within fine silt which provided a growing medium for scattered short vegetation. Small tufts of a moss, probably *Schistidium rivulare*, were particularly characteristic of most of the sites and herbs noted included ribwort plantain *Plantago lanceolata*, sheep's sorrel *Rumex acetosella*, devil's-bit scabious *Succisa pratensis* and tansy *Tanacetum vulgare*.

The 7-spot Ladybird *Coccinella septempunctata* (L.) was noted at four of these six sites. A minority of the 5-spot Ladybirds displayed seven spots, with a tiny spot on each side towards the front of the elytra. However, the species were easily separable on size, general shape and the shape of the white area on the side of the pronotum. No other ladybird species were noted at these shingle sites.

During the period of these searches along the River Dee, two sites on lower reaches of the nearby River Don were identified from online aerial photographs as holding potentially suitable habitat. Upon visiting, though, both were found to be rather different in nature and searches did not reveal the presence of *C. quinquepunctata*. Online aerial photographs show further potentially suitable habitat along the River Dee, in the upper reaches upstream of Braemar, and these areas will be searched in spring 2015.

These records have been submitted to the UK Ladybird Recording Scheme. Thanks to Rose Toney for assisting with searches at some sites, to Ruth Mitchell and Andrea Britton for assisting with plant identification and to Val MacAtear, Royal Entomological Society librarian, for providing a copy of Majerus & Fowles (1989). – NICK A. LITTLEWOOD, East Quartains, Drumoak, Banchory, AB31 5ER. Email: nick.littlewood@yahoo.co.uk

REFERENCES

Goldie, M. 2013. Invertebrate surveying techniques at Kindrogan Field Centre. *Recorder News*, Biological Recording in Scotland newsletter, issue 91: 6.

Majerus, M. E. N. & Fowles, A. P. 1989. The rediscovery of the 5-spot Ladybird (*Coccinella 5-punctata* L.) (Col., Coccinellidae) in Britain. *Entomologist's Monthly Magazine* **125**: 177–181.

Roy, H. E., Brown, P. M. J., Frost, R. & Poland, R. L. 2011. *The Ladybirds* (*Coccinellidae*) *of Britain and Ireland*. FSC Publications, Shrewsbury.

A shore bug bonanza in Oxfordshire and *Saldula opacula* (Zetterstedt) (Hemiptera: Saldidae) new to the county. – Southwood & Leston (1959), quoting Butler, states on the shore bugs "Much hunting yields but few Saldas, and he who desires to cultivate the virtue of patience, cannot do better than try a day's Salda-hunting". My own experiences have supported this view and my collection contained very few specimens of Saldidae, these being singletons that had occasionally found their way into my sweep net.

This situation changed on 11 June 2014 during a visit to New Marston Meadows, Oxford (Plate 4, Fig. 1). A drainage ditch had been dredged in the previous year, and the spoil tipped onto the surrounding water meadow, close to the River Cherwell (SP518078), creating a barren area of wet mud which was beginning to be re-colonised by plants. I decided to sample the fauna on the sparse vegetation with my sweep net and was surprised to discover several shore bugs amongst my catch (Plate 4, Fig. 1). As I swept on, more were captured, and I soon discovered that the plants were not necessary to obtain the bugs. Sweeping over the un-vegetated, bare mud was much more efficient. So began an enjoyable twenty minutes or so perambulating this muddy area, sweeping the net to and fro in front of me as I went. Presumably, in the warm, sunny conditions, the bugs were jumping or flying from the mud as I approached, some ending up in my net. This agility made them difficult to gather into my pooter before taking flight, but I nevertheless obtained an ample quantity. At home, I counted the catch and found 134 shore bugs, comprising 113 *Saldula saltatoria* (L.) and 21 *Saldula pallipes* (F.).

There was considerable variation in the markings of the captured bugs, particularly with *S. pallipes* and I thought that the New Marston site offered an excellent opportunity to build a good reference collection of these insects, regarded by many as being difficult to identify. So, three days later, I returned to the Meadows and set about collecting another series of the animals. The conditions were different from before, being cooler and overcast, with occasional light rain. A raised river level had submerged part of the site and some of my footprints from before were now small pools of water. In these changed conditions, fewer saldids were finding their way into my sweep net, although those captured were more easily gathered into my pooter. The reduced agility of the animals made them easier to spot and approach on the mud. Some were seen to swim across the small pools, like miniature pond-skaters. In over an hour of collecting, 114 shore bugs were taken, 92% or which were male, compared with 53% on my previous visit. Clearly, the females were much more reluctant to jump or fly than the males in the less favourable conditions. The catch divided into 94 *S. saltatoria*, 19 *S. pallipes* and a singleton of *Saldula opacula* (Zetterstedt) (Plate 4, Fig. 2).

Southwood & Leston describe *S. opacula* as "always rare" and give its habitat as "estuarine marshes". Kirby (1992) categorises the bug as Notable B. Kirby (1999) states that the bug has "a declining reputation as a rarity" and although most frequent in coastal brackish areas, it has also been found in East Anglian fens and Peterborough clay pits (Plate 4, Fig. 2). Ryan (2014a) lists just six counties in England from which it has so far been recorded. To this list must now be added Oxfordshire, which can be seen from Plate 4, Fig. 2 to extend the reported range of this species in England significantly further inland.

Although I now had more than enough specimens of *S. saltatoria* and *S. pallipes* for my reference collection, I decided to make a third visit to New Marston Meadows to see if more *S. opacula* could be found, and thereby confirm this record as being more than a chance encounter. Sustained collecting on 17 June, a warm, sunny day, gathered 564 shore bugs, 53% of which were male, as in the first visit. The catch

divided into 483 *S. saltatoria*, 79 *S. pallipes* and two *S. opacula*. The record of the last species was therefore confirmed at the site.

Given that the collection of so many shore bugs from one place was entirely unique in my experience and I had not read of any other account of it, I pondered over the significance of my collecting at New Marston Meadows. Was the large number of saldids and the presence of *S. opacula*, due to the singular circumstances at the site; or was my technique of 'mud-sweeping' novel in its application to the study of the Saldidae and could it be used elsewhere with similar effect? There was only one way to answer this question, and two other locations in Oxfordshire came immediately to mind for the further employment of my technique.

The first was a lake outside Stanton Harcourt, the north perimeter of which had several hundred metres of accessible muddy shoreline (SP410053). In two trips, on 3 and 4 July, in the warm, sunny but rather windy conditions, I took 284 shore bugs by mud-sweeping. These comprised 174 *S. saltatoria*, 84 *S. pallipes* and 26 *S. opacula*. The second location was a lake near Stanton St John (SP570090), which is fed by a spring, and used to maintain the level of an adjacent lower lake via a sluice. The frequently changing level of this upper lake, which at times becomes completely drained, regularly provides large expanses of muddy shore, much to my frustration when searching for water bugs. In June, the water level was very high and had inundated the surrounding grassland, with no mud exposed. But when I visited on 17 July, a hot, humid day, the water level was lower and I could employ mud-sweeping. A total of 130 shore bugs were taken, comprising 68 *S. saltatoria*, 51 *S. pallipes* and 11 *S. opacula*.

It will be clear from these results that there was nothing unique about the conditions at New Marston Meadows which led to the capture of so many shore bugs and *S. opacula*. The mud-sweeping technique is generally applicable to the collection of large numbers of saldids, given a sufficiently large area of mud and appropriate weather. Furthermore, *S. opacula* is clearly well established in Oxfordshire. Having found three sites for this species in three attempts, it surely must also occur in places where I have yet to look. Given the outlying situation of Oxfordshire in relation to the other county records, the bug presumably also occurs in counties from which it has yet to be recorded. This consideration, together with the fact of the bug's presence in Scotland and Ireland (Ryan, 2014a), suggests that *S. opacula* may have a national distribution that is much wider than is currently on record. – R. P. RYAN, 38 St John Street, Oxford, OX1 2LH (email: RobRyanBugs@gmail.com).

REFERENCES

Kirby, P. 1992. *A review of the scarce and threatened Hemiptera of Great Britain. UK Nature Conservation No 2*. Joint Nature Conservation Committee, Peterborough.

Kirby, P. 1999. A note on finding and recognising *Saldula opacula*. *Heteroptera Study Group Newsletter* **14**: 8.

Ryan, R. P. 2014a. The county distribution of the Hemiptera-Heteroptera of the British Isles, fourth edition. *Hemipterist* **1**: 38–103. *https://sites.google.com/site/thehemipterist*.

Ryan, R. P. 2014b. An Atlas of the Hemiptera-Heteroptera of the British Isles. *https://sites.google.com/site/BritishHetBugAtlas*.

Southwood, T. R. E. & Leston, D. 1959. *Land and water bugs of the British Isles*, Frederick Warne & Co. Ltd., London.

FIELD MEETING REPORTS

Shotover Hill and Brasenose Wood SSSI, Oxfordshire, 29–30 June 2013

Leader: **Ivan Wright**. The underlying purpose of this joint field meeting with Shotover Wildlife was to increase the records of particular taxa for a forthcoming publication about the natural history of Shotover; an area of diverse habitats on high ground just to the east of Oxford City. Shotover Wildlife has been recording the flora and fauna since 1999, and although many invertebrate groups are now well represented by recent records, there was still a need for further information on Diptera and Hemiptera. A secondary objective was to support an ongoing project by Shotover Wildlife comparing the current invertebrate fauna of Shotover with that recorded in the early 20th century by entomologists of Oxford University Museum (Salzman, 1939) most notably Diptera by A. H. Hamm and Coleoptera by J. J. Walker.

The weather for the weekend was warm and dry, and the Saturday was spent sweeping and beating on the sandy habitats and scrub woodland at the top of the hill. Activity on the following day focussed on the lower slopes, recording in the ancient woodland of Brasenose Wood and the adjoining unimproved grassland of Slade Camp. Overnight moth recording was operated in an old hay-meadow at the top of the hill and a large mature garden on the east side of the hill. Overall, the weekend recorded 264 species of invertebrate, with 73 of these being new species for the area, and 20 species were identified that had not been recorded since the period 1903–1939.

Sweeping and beating for Coleoptera returned 85 species with 18 species added for the site, which is a good result considering that in 2013 the recorded diversity was already 920 species. Among the scarcer Coleoptera were *Glaphyra umbellatarum* (von Schreber) (Cerambycidae) found by Allan Lawson in Brasenose Wood , and two specimens each of *Omiamima mollina* (Boheman) (Curculionidae) and *Hypopycna rufula* (Erichson) (Staphylinidae) netted by Bonnie Collins and Steve Gregory from the neutral and acidic grasslands.

The Diptera were one of our target species groups, and of the 64 species identified, 27 were new recent records. In fact Sam Jones netted *Scathophaga lutaria* (F.) (Scathophagidae) in the same week that it had been last recorded 110 years previously by Albert Hamm. The scarce *Nephrocerus flavicornis* Zetterstedt (Pipunculidae) one of the largest species in this family, was swept from path edges in Brasenose Wood. This was a new record for the site at the time although several specimens of both genders were later recovered from a nearby Malaise trap. The other particular target group was Hemiptera and here we were rewarded with 66 species in the two days including nine new records. Many of us swept *Ditropis pteridis* (Spinola) (Delphacidae) from acidic grassland and the author netted *Tachycixius pilosus* (Olivier) (Cixiidae) in old woodland; both of these species are under-recorded in Oxfordshire and had not been published for Shotover since 1939.

It was pleasure to welcome Dom Collins to Shotover, a specialist in Thysanoptera, who had come (with proportionately small beating tray) to look on the *Mercurialis perennis* (Euphorbiaceae) for *Thrips fulvipes* Bagnall (Thripidae). The species had been originally described from Shotover material in 1923 by R. S. Bagnell, from specimens collected in 1916 by H. Britten. Unfortunately *T. fulvipes* was not found during the Field Meeting, but twelve common species of thrips are now recorded for the SSSI.

The overnight moth recording returned records for 125 species plus eight common Coleoptera. We had the good fortune of being able to use a large private garden on the east of the hill, placing an MV Robinson trap in an old orchard surrounded by a mixture of mature habitats (Fig. 1). The owner was suitably rewarded and delighted,

Fig. 1. BENHS member Lawrence Bee setting up the light traps in the private garden on Shotover Hill, Oxfordshire, June 2013. Photo: Ivan Wright.

having never before seen a Privet Hawk-moth *Sphinx ligustri* L. In total 40 species were identified *in situ* by Marc Botham which included the locally-scarce Ruddy Carpet *Catarhoe rubidata* (D. & S.). The main moth recording for the night was set up in an old unimproved hay-meadow at the top of the hill surrounded by secondary woodland and pasture. Here field observations were led by Marc, and together with Actinic and MV Robinson traps, returned 113 species including Red-necked Footman *Atolmis rubricollis* (L.) and a rather westerly Fenland Pearl *Anania perlucidalis* (Hübn.).

Shotover is well recorded for aculeate Hymenoptera (Wright & Gregory, 2006) and Symphyta, and in light of the focus on other groups few records were added, however two common species of Symphyta were added to our knowledge of the site. The hill has been comprehensively surveyed for flora in recent years, nevertheless, the Shotover Wildlife bryologists took the opportunity of the Field Meeting for further surveying; and not without reward. Jacqueline Wright was pleased to have found new colonies of the tiny liverwort *Microlejeunea minutissima* (Mizut.) Grolle, and the pollution-sensitive moss *Orthotrichum pulchellum* Brunton on a 40-year old willow. The liverwort is mostly a coastal species and is uncommon this far inland, and the moss has probably been able to establish on the willow because of the cleaner air these days – downwind of the Cowley car factory. Both of these bryophytes are uncommon in Oxfordshire.

The author is not only especially grateful to the surveyors who attended the meeting, but also Jim Flanagan (Hemiptera), Tim Newton (Coleoptera) and David Gibbs (Diptera) for subsequent identification work.

References

Salzman, L. P. (Ed.) 1939. *Victoria County History of Oxfordshire*. University of London Institute of Historical Research. Vol. 1. Oxford University Press.

Wright, I. R. & Gregory, S .J . 2006. The aculeate Hymenoptera of Shotover Hill, Oxfordshire. *British Journal of Entomology and Natural History* **19**: 65–76.

Beale Park, Pangbourne, Berkshire, 30–31 May 2014

Leader: **Ian Sims**. – This field meeting, the first of two planned for this venue in 2014, was a joint meeting between the British Entomological and Natural History Society (BENHS) and the Berkshire Moth Group (BMG). The aim was to assess the population of a weevil, *Polydrusus impressifrons* Gyllenhal, identified as new to the British Isles during a field meeting on this site around this time the previous year (*BJE&NH* **27**: 141–142) and to look closer at an interesting area of reed bed close to the River Thames, where a strong population of the Balsam Carpet *Xanthorhoe biriviata* (Borkhausen) is known to exist.

By the arranged meeting time (20.30h) half a dozen members of the BMG and BENHS had arrived and we dispersed to beat trees to assess the distribution of the new weevil in the area. Before long many examples were found, mostly on oaks in the vicinity of the main car park. Pairs in-copula were not unusual, and it was noted that males had rubbed some of the green hairs/scales from the centre of the females' thorax, leaving a dark shiny patch of cuticle, thus making mated females easy to identify.

As dusk approached we set up nine 120w Mercury Vapour (MV) lights around the park and the evening's recording began. Paul Black set his light on the edge of the reed bed, and this proved to be one of the best sites that night, for both moth numbers and species diversity.

Lepidoptera-wise, a total of 124 moths (100 macros and 24 micros) and two butterflies were recorded. The most interesting of these were *Agonopterix alstromeriana* (Clerck), the larvae of which feed on the flowers and leaves of that most deadly plant hemlock *Conium maculatum*, Maiden's Blush *Cyclophora punctaria* (L.) believed to be a new record for this site, Small Elephant Hawk *Deilephila porcellus* (L.) another new site record, Shears *Hada plebeja* (L.), Light Brocade *Lacanobia w-latinum* (Hufn.) and Alder moth *Acronicta alni* (L.). The best record was probably one Small Clouded Brindle *Apamea unanimis* (Hübn.) recorded by Paul Black beside the reed bed. The commonest macromoth was the Treble Lines *Charanyca trigrammica* (Hufn.), with over 50 being seen, which included some unusual varieties.

Few species of other orders were recorded, but the large tabanid horse fly, *Tabanus brumius* L., was noted by one participant who avoided being bitten!

Dinton Pastures, near Reading, Berkshire, 28–29 June 2014

Leader: **Ian Sims**. – This field meeting, one of two scheduled for this site in 2014, was planned to coincide with National Insect Week. It was a joint meeting between the British Entomological and Natural History Society (BENHS), Berkshire Moth Group (BMG) and the Amateur Entomologist's Society (AES). The leader met four participants in the main car park near the Pelham-Clinton Building at 21.00h, from where we dispersed around the country park and ran six 120w Mercury Vapour (MV) lights until the following morning. The plan was to hold some of the catch and show these moths to the public on the morning of the 29th. After this, any participants who were interested in seeing the Society's Library and collections were given a guided tour of the Pelham-Clinton Building. It was intended that the meeting would then be taken over by the AES for further recording of insects around the country park.

By the morning of the 29th a total of 104 Lepidoptera had been noted, comprising 12 species of micros, 91 macromoth species and one species of butterfly. Amongst the more unusual species for the area were:

Ghost Moth *Hepialus humuli* (L.), one at MV; many larvae of the stigmellids *Ectoedemia louisella* (Sircom) mining field maple keys and *Stigmella aceris* (Frey) mining field maple leaves; Poplar Lutestring *Tethea or* (D. & S.), two at MV; Triple-spotted Pug *Eupithecia trisignaria* H.-S., one at MV; Sloe Pug *Pasiphila chloerata* (Mabille), two at MV; BrownTail *Euproctis chrysorrhoea* (L.), one at MV; Hoary Footman *Eilema caniola* (Hübn.), one at MV; a very early Copper Underwing *Amphipyra pyramidea* (L.) at MV; Reddish Light Arches *Apamea sublustris* (Esper), one at MV, believed to be a new site record and Slender Brindle, *A. scolopacina* (Esper), one at MV.

Without a shadow of doubt though, by far the best record of the night was one example of the Scarce Burnished Brass, *Diachrysa chryson* (Esper), which came to light in a marshy area near the Embrook at around 02.00h on the 29th. This is the first time it has been recorded at Dinton Pastures, which represents one of very few sites for it in Berkshire (VC 22).

The following morning after breakfast, the show-and-tell session with several members going through their traps and explaining to members of the public what the species were and their significance was very well received, and made a valuable contribution to National Insect Week.

After a guided tour of our rooms the formal BENHS-led meeting closed, and the AES then took over to take its members around the country park for some further recording.

Beale Park, Pangbourne, Berkshire, 6–7 September, 2014

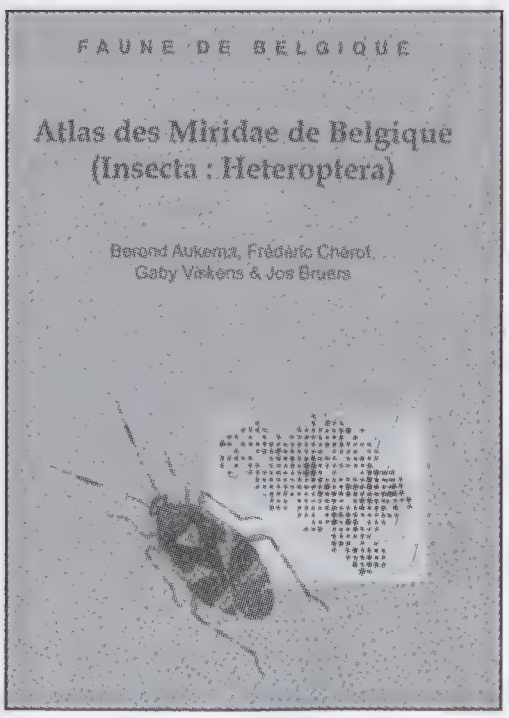
Leader: **Ian Sims**. – This was the second field meeting held at this venue in 2014. The objective was to contribute records to this year's Bioblitz at the Park.

By 19.30h on the Saturday, seven members of the British Entomological and Natural History Society and the Berkshire Moth Group had assembled in the visitors' car park. After introductions and a description of the site by the Park Supervisor, Dave Coles, we set up eight 120w MV lights at various sites around the visitor centre and a marsh bordering the River Thames. These were operated until the following morning, by which time 87 species of Lepidoptera (28 micros, 57 macromoths and 2 butterflies) had been recorded.

Some of the more notable species of Lepidoptera seen as adults to MV, unless otherwise stated, included larval mines of *Phyllonorycter comparella* (Duponchel) in leaves of white poplars at the main entrance to the park (a new site record, and one of very few sites for this species in Berkshire) one larva of the local *Cosmopterix zieglerella* (Hübn.) mining hop, the Barred Hook-tip *Watsonalla cultraria* (F.), Mocha *Cyclophora annularia* (F.) (believed to be the first record for this site, and another Berkshire scarcity), Maple Prominent *Ptilodoma cucullina* (D. & S.), Round-winged Muslin *Thumatha senex* (Hübn.) (recorded at light on the margins of the reed bed), Old Lady *Mormo maura* (L.) and Red Underwing *Catocala nupta* (L.). In addition, there was a late Copper Underwing, *Amphipyra pyramidea* (L.), so taking into account our meeting here earlier in the year it is safe to say that the flight season for this species at Beale Park has lasted from the end of May to early September, three or more months!

Other orders of insect, recorded by Jon Cole, included the bumblebees *Bombus hypnorum* (L.) and *B. pascuorum* (Scopoli), 14 species of beetle (though nothing new to the UK this year!), five species of Hemiptera including the Field Damsel Bug *Nabis ferus* (L.), the scorpion fly *Panorpa germanica* L. and an ephemeropteran. Several species of caddis fly that came to light have yet to be identified.

BOOK REVIEWS

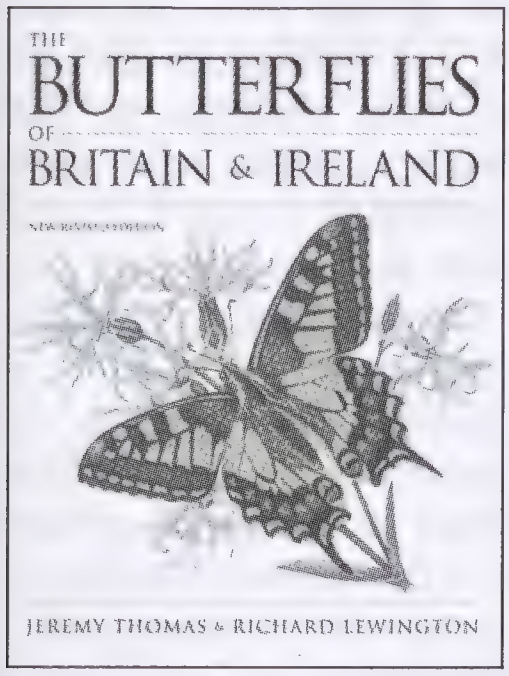

FAUNE DE BELGIQUE
Atlas des Miridae de Belgique
(Insecta : Heteroptera)
Berend Aukema, Frédéric Chérot,
Gaby Viskens & Jos Bruers

Atlas des Miridae de Belgique (Insecta: Heteroptera) by B. Aukema, F. Chérot, G. Viskens & J. Bruers, 2014. Royal Belgian Institute of Natural Sciences, 311pp. €60.00 plus p&p. ISBN: 978 9 0732423 3 3.

This monumental book, available in two languages (Dutch or French), provides distributional, ecological and phenological information about the 231 mirid species living in Belgium. For each species the authors specify the references on which its identification is based, summarize its geographical distribution in Belgium and Europe, offer updated information about its status in Belgium, provide an overview of its habitat and ecology, and list the most important relevant literature. All this information is accompanied by European distribution maps and maps with observations or catches until 1980 and from 1980 up to 2012 in Belgium. Graphs of the phenology of males and females in Belgium are also presented. Finally, several species are illustrated by magnificent colour photographs.

This book is useful for everyone interested in the biology of Hemiptera-Heteroptera. As such it may appeal to both professional researchers and citizen scientists.

JOHN STEWART

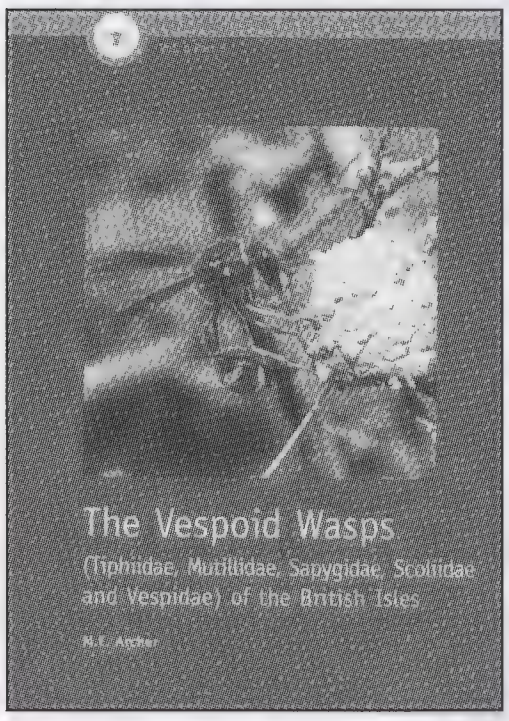


The Butterflies of Britain & Ireland by Jeremy Thomas and Richard Lewington. New revised Edition. (British Wildlife Publishing, 2014) 288 pp, 900+ colour illustrations. Softback £16.95. ISBN 13-9780-956490261.

The famous duo of Jeremy and Richard have done it again. This revised edition contains a wealth of new information about the biology of our 60 or so British butterflies, occasional immigrants and two new species, Cryptic Wood White *Leptidea juvernica* Williams and Geranium Bronze *Cacyreus marshalli* Butler. First, but secondmost, the book acts as a typical identification guide, with useful tips on how to identify difficult species from among the various groups (most groups I reckon when they are on the wing) with accompanying illustrations which should leave readers in no doubt as to which species they are observing. Up-to-date distribution maps and life history charts for each species provide additional information to help with identification. I suspect this may be how this book will be primarily used. But there is far more depth to this book than that – you can use the illustrations to identify butterfly species by their egg, larval and pupal stages, certainly not something you would ever contemplate attempting to use the equivalent MBGBI volume for, with its long sections of dry descriptive text about instars, which, when you think about it, rely almost entirely on the reader already knowing what the species is in the first place! The book is a real joy to read – it describes how butterfly species live in the wild – real live animals: no room here for descriptions of how many eggs are laid in captivity under atypical conditions, larvae forced to feed on suboptimal or unnatural food plants etc. There is information on where butterflies naturally choose to lay their eggs, how many,

and on which foodplants, all based on recent observations made in the field. Free rein is given to describing butterfly and caterpillar behaviour in such an enthusiastic way that you want to rush outside and check these observations for yourself. We all too often map species distributions on a macro scale relying on trapping techniques skewed to attracting adult insects to us when it might be more rewarding and scientific in terms of conservation to map species based on their immature stages which define their habitat requirements and population sizes more accurately. For example, what are the key parameters defining a Speckled Wood patch? What is the minimum sustainable population size? Is hedgerow habitat colonised more frequently in the north than the south? There is a lot that needs to be done studying our butterflies and this is undoubtedly the best book to have in your pocket.

JOHN BADMIN



The Vespoid Wasps (Tiphiidae, Mutillidae, Sapygidae, Scoliidae and Vespidae) of the British Isles, by Michael E. Archer. Handbooks for the Identification of British Insects Volume 6 Part 6. Published for the Royal Entomological Society by the Field Studies Council, 2014. 82 pp, 12 plates with 61 colour photographs. Softcover £25.50. ISBN 13 978-0-90154-698-2.

This bright, new publication provides updated keys for a number of the groups previously dealt with in Volume 6 Part 3(b) of the RES handbooks. It has been 34 years since O. W. Richards' handbook was published, and, as might be expected, there have been changes in the accepted taxonomy of the groups covered, and new species (though few) have been recorded in the UK. As well as covering these recent arrivals, the new volume covers species found in the Channel Islands and includes a detailed description of the much anticipated Asian hornet *Vespa velutina*, which is creeping northwards through France.

But things have moved on in the world of publishing as much as in the world of taxonomy, and the new publication takes advantage of these. A number of line drawings, illustrating key identification features are included at the appropriate points within the keys, and, best of all, colour photographs of mounted specimens are provided for 35 of the 45 species. As a relative newcomer to the Hymenoptera, I long for photos in identification keys: the technical features are all very well, but it is invariably useful to be able to check that the specimen in your hand actually resembles the species you think it is!

Having run a couple of specimens through the keys as well as going through the book as a whole, I've found it to be clear, workmanlike and readable, and (and this is no small thing) that the size and format are convenient for laying the book open on the desk next to the microscope. The individual species profiles are very thorough, and the short pieces of advice on mounting and setting specimens, which are scattered in the appropriate places throughout the text, look to be eminently useful. Notwithstanding the few minor errors in the text (a short erratum sheet can be found on the RES website http://www.royensoc.co.uk/sites/default/files/erratum%20vespoid%20A4.pdf), I very much look forward to giving this new volume a good work-out in the next recording season.

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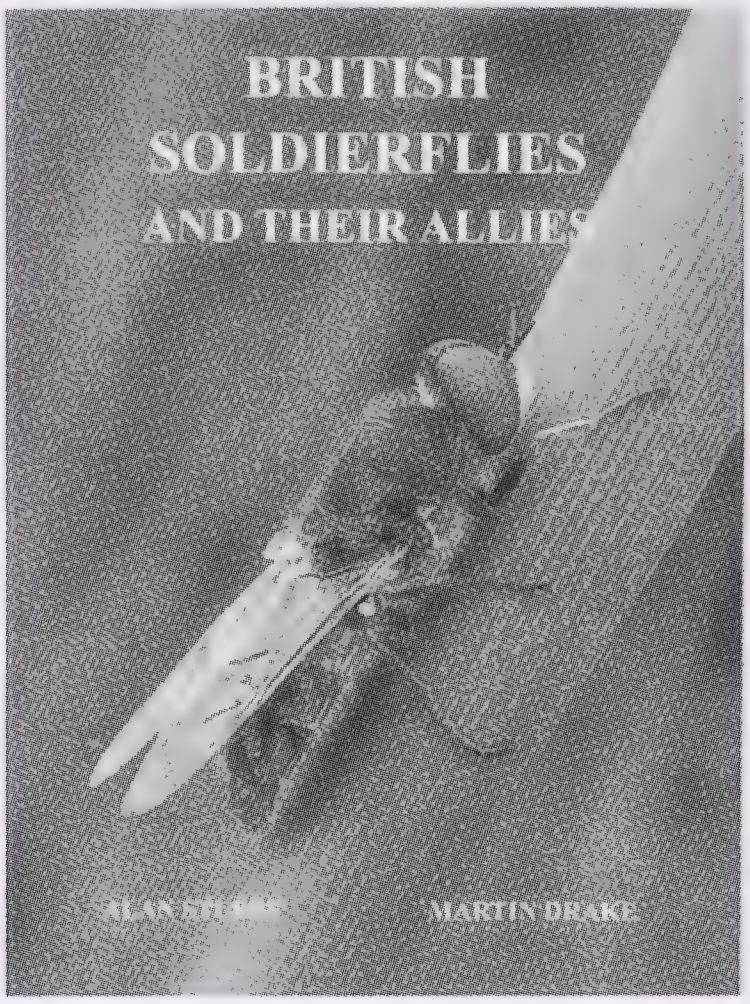

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Cover photograph: Globular galls of the cynipid *Trigonaspis megaptera* (Panzer), Blean Woods, Kent, 2013. Photo: Sally Jennings.

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THE LEAFHOPPERS *FIEBERIELLA FLORII* AND *F. SEPTENTRIONALIS* (HEMIPTERA: CICADELLIDAE) NEW TO BRITAIN

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ABSTRACT

The genus *Fieberiella* and two constituent species (*F. florii* (Stål) and *F. septentrionalis* W. Wagner) are brought forward as new to Britain having been reported from two widely separated parts of the country. *Fieberiella florii* and *F. septentrionalis* were first recorded in west London (1998) and Yorkshire (2010) respectively. Both species have since been recorded widely within the Greater London area. Whether either species occurs more widely in Britain, or the extent to which the two species occur sympatrically, is unknown. Both species have been recorded exclusively in ruderal or synanthropic habitats with anecdotal information indicating that they may have been introduced through the horticultural trade.

HISTORY OF RECORDS IN BRITAIN

On 16 September 1998, PJH collected six females of a *Fieberiella* species whilst carrying out a general entomological survey of land owned by the Guinness brewery at Park Royal, Middlesex (VC 21) (TQ 191823). The site was revisited on the 28th of the same month by PJH and AJAS, when a further three specimens were recorded (one male and two females). The male was subsequently identified as *F. florii* (Stål) based upon examination of the genitalia, and a single female from this collection was later confirmed by Herbert Nickel as *F. florii*. On both occasions, the specimens were collected by beating sapling and more established cherry trees (*Prunus* sp.) growing on the south-facing side of a tall spoil mound located on a small triangular area of land between a railway line, a road and an industrial development.

Three female *Fieberiella* sp. were recorded by PJH and AJAS at Brooklands, near Weybridge, Surrey (VC17) (TQ 068621) on 10 and 12 September 2006, on various bushes and shrubs, including *Rosa rugosa*, growing amongst cultivated plant borders in a housing estate and bordering a canal. These were assumed to be *F. florii* on the basis of the previous records of this species. Subsequently, two male *F. florii* (determined by dissection) and four females were recorded at Imperial Wharf, Chelsea Harbour, Middlesex (VC21) (TQ 263762) on 10 and 15 September 2008, swept off a non-native *Salix* species and other bushes growing in a small public park.

Since collating our own information, we have learnt of records of *F. florii* collected using yellow sticky traps in experimental apple orchards at East Malling Research Station in Kent in 2002 (Bleicher *et al.*, 2010).

The first record of *F. septentrionalis* W. Wagner in Britain was made by JF on 12 August 2010 at a brownfield site on the north side of Wath upon Dearne, Rotherham, South Yorkshire (VC 63) (SE44030130). The site was re-visited on 21 August and further specimens of adult males, females and nymphs were taken. On

both visits, adults and nymphs were collected from sapling and young grey willow, *Salix cinerea* (Plate 5, Fig. 1). Sampling pure stands of birch, *Betula* sp., and goat willow, *Salix caprea,* within the same site and visits to other apparently suitable locations in the Dearne Valley in the following weeks failed to yield any further specimens. Return visits to the Wath upon Dearne site were made the following year. No *Fiebierella* were found on 2 July, but both adults and nymphs were recorded frequently on or near grey willow on 14 August; of these, two males were dissected and confirmed as *F. septentrionalis*. On each visit to the Wath site, many more *Fieberiella* individuals were observed than were taken as specimens, indicating a self-sustaining but localised population. Other sites in the vicinity were searched to ascertain the extent of colonisation. A single *Fieberiella* specimen was beaten, but not captured, from a stand of hazel and guelder rose at a site 600m to the east of the first site on the south side of the A6023 (SE446012) in an area of soft landscaping adjacent to a recently constructed business park.

It is possible that *Fieberiella* species were present but undetected in Britain for some time before the dates of the records listed here. Dr Mike Wilson has recalled being shown a nymph of a *Fieberiella* species that had been collected in the garden of the Natural History Museum in the mid-1980s. The subsequent discovery of *F. florii* in the same garden in 2012 suggests that a population of this species may have persisted there for some time. The records reported here suggest that *F. florii* has a slightly later phenology in Britain compared to *F. septentrionalis*, a distinction not reflected in the main identification works.

Identification

Adult *Fieberiella* can be separated from the two other genera in the Fieberiellini that occur in Britain, *Placotettix* Ribaut and *Synophropsis* Haupt, by (a) a sprinkling of fine dark spots extending over the entire dorsal surface, and (b) a sharp keel at the transition from the vertex to the face (Plate 5, Figs 2 & 3) (Wilson *et al.*, 2015). In the other two genera there is no sprinkling of fine dark spots and the transition from the vertex to face is more rounded. The ground colour of the forewings in *Fieberiella* is dingy olive-brown, but there are semi-transparent panels on the margins of the apical cells and at the apex of the corio-claval suture. *Fieberiella* nymphs can be separated from those of the other two genera on the basis of fine spotting on the body that is similar to that shown in the adults (Stöckmann *et al.*, 2013).

Separation of the two *Fieberiella* species is impossible in the field. Males are readily separated on the basis of the shape of the aedeagus, especially in lateral view (Figs 1a & 1b), and the presence or absence of teeth on the pygofer appendages. Females can be separated by removing or lifting the seventh abdominal sternite to enable inspection of the ovipositor base. In *F. florii* this appears as a single rounded point whereas in *F. septentrionalis* it is bifurcate (Biedermann & Niedringhaus, 2009). *Fieberiella florii* is generally larger than *F. septentrionalis*, although the adult size ranges overlap.

European distribution

Both species have a central and south-eastern distribution within continental Europe, extending from Germany and Poland in the north to the eastern Mediterranean and the Balkans in the south. There does not appear to be any evidence of range expansion in any of these areas. Both species are absent from Scandinavia and the Baltic states, although both extend into eastern Europe and the

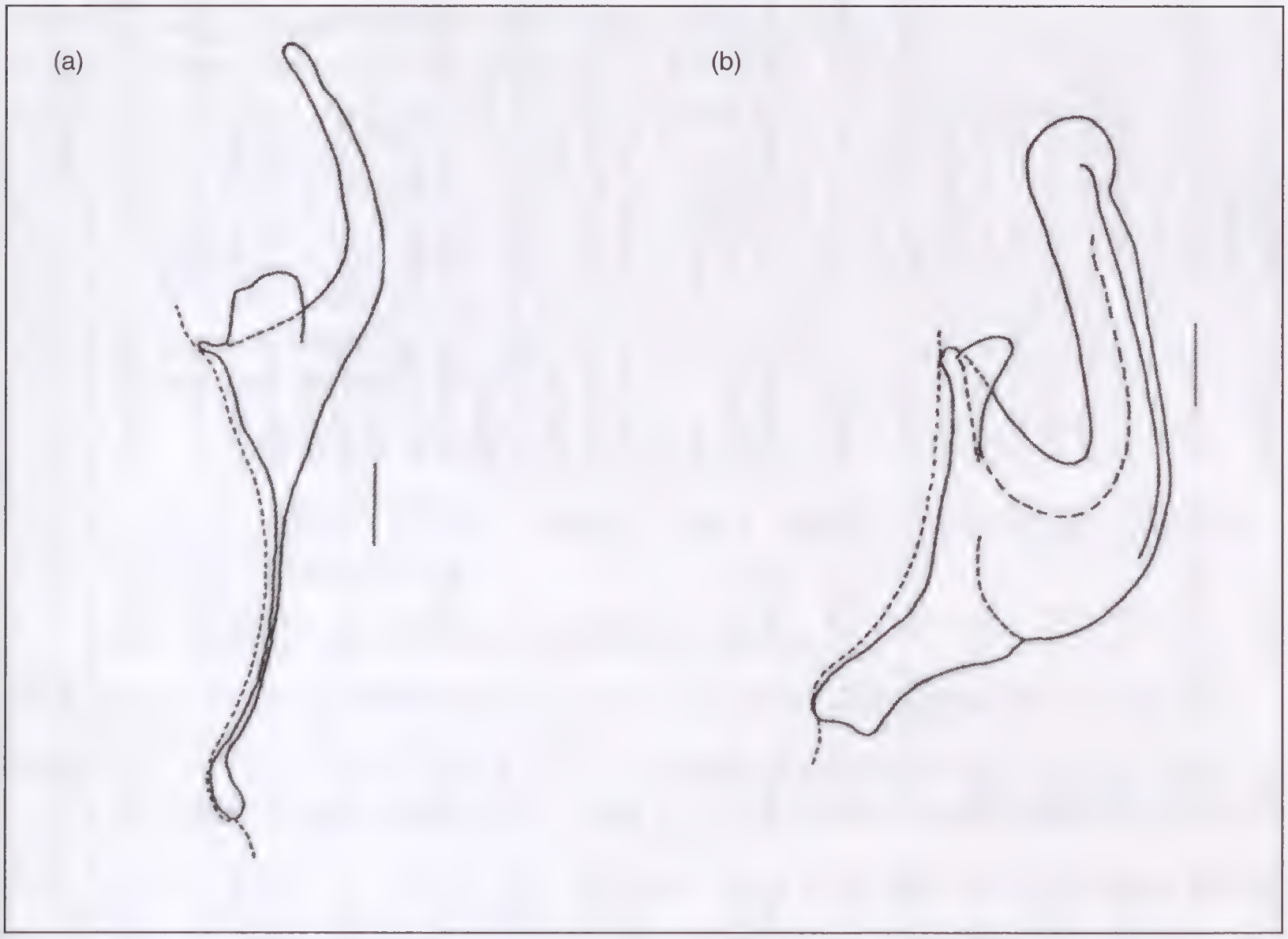

Figure 1. Male aedeagus of (a) *Fieberiella florii* and (b) *F. septentrionalis* in lateral view (after Beidermann & Niedringhaus, 2009).

former USSR (Nast, 1987). Records for *F. florii* cover a broad range across continental Europe that includes France, Italy, Greece and north-eastern Spain (Meyer-Arndt & Remane, 1992). Nickel (2003) reports a rather clear northern limit across middle Germany. Although recorded from The Netherlands, *F. florii* is apparently absent from Belgium (Nast, 1987) and coastal northern France (della Giustina, 1989). *Fieberiella septentrionalis* appears to have a more restricted and eastern distribution, being absent from France (della Giustina, 1989), Belgium and the Netherlands (den Bieman *et al.*, 2011), Austria, Italy and the Iberian peninsular (Meyer-Arndt & Remane, 1992). *Fieberiella florii* has been introduced into both the USA (Swenson, 1974) and Canada (Hamilton, 1983; Meyer-Arndt & Remane, 1992).

Host plants and ecology

Both *Fieberiella* species are polyphagous on woody shrubs and trees. Nickel (2003) lists a number of plants with which each species is associated, with considerable overlap between them, including blackthorn, *Prunus spinosa*, Japanese rose, *Rosa rugosa*, privet, *Ligustrum vulgare* and brambles, *Rubus* spp. The plants on which the specimens reported here were caught are consistent with this list, although *F. septentrionalis* seems to show a frequent association with *Salix* species (Table 1). North American sources refer to *F. florii* as the 'Privet Leafhopper' but none of the records so far from Britain has come from this plant. The habitats for these species tend to be essentially open with scattered bushes or trees, often at margins with more dense scrub or woodland. One feature that does link the habitats is that

Table 1. Records of *Fieberiella* species listed in chronological order

Species	Site	Grid-reference	VC	M	F	Date	Recorder	Determiner	Method	Plants/habitat
Fieberiella florii	Park Royal, London	TQ191823	21		6	16.ix.1998	PJH	PJH	Beating	*Prunus* spp. on waste ground
Fieberiella florii	Park Royal, London	TQ191823	21	1	3	28.ix.1998	AJAS, PJH	AJAS, PJH	Beating	*Prunus* spp. on waste ground
Fieberiella florii	East Malling Research Station	TQ7257	16	1		17.ix.2002	KB	KB	Yellow sticky trap	Apple orchard (var. Discovery)
Fieberiella florii	East Malling Research Station	TQ7257	16		1	04.x.2002	KB	KB	Yellow sticky trap	Apple orchard (var. Discovery)
Fieberiella florii	East Malling Research Station	TQ7257	16		1	04.x.2002	KB	KB	Yellow sticky trap	Apple orchard (var. Discovery)
Fieberiella florii	Brooklands, Weybridge	TQ068621	17		3	12.ix.2006	AJAS, PJH	AJAS, PJH	Beating	*Rosa rugosa* on roadside verge
Fieberiella florii	Imperial Wharf, Chelsea Harbour	TQ263762	21	2	4	15.ix.2008	AJAS, PJH	AJAS, PJH	Beating	*Salix* sp. in urban park
Fieberiella florii	Mitcham Common	TQ296678	17			09.x.2008	GAC	MRW	Sweeping	Acid grassland with scrub
Fieberiella florii	Natural History Museum wildlife garden	TQ265790	20	1	2	31.x.2012	NHM	TB	Malaise trap	Planted urban wildlife garden
Fieberiella septentrionalis	Wath upon Dearne	SE4401	63	1		12.viii.2010	JF	JF	Sweeping	*Betula*/*Salix*
Fieberiella septentrionalis	Wath upon Dearne	SE4401	63	1	1	21.viii.2010	JF	JF	Sweeping/ beating	Young *Salix cinerea*
Fieberiella septentrionalis	Wath upon Dearne	SE4401	63	5	6	30.viii.2010	JF	JF	Sweeping/ beating	Young *Salix cinerea*
Fieberiella septentrionalis	Hurst Park, Molesey	TQ145688	17			05.viii.2011	GAC	GAC	Sweeping	Grassland with scrub
Fieberiella septentrionalis	Wath upon Dearne	SE440014	63	4	5	14.viii.2011	JF	JF	Sweeping/ beating	*Salix cinerea*
Fieberiella septentrionalis	Wath upon Dearne	SE4401	63	2		02.ix.2012	JF	JF	Sweeping/ beating	*Salix cinerea*
Fieberiella septentrionalis	Halling chalk pit	TQ693645	16	1	1	07.viii.2013	TB	TB	Sweeping	*Salix* scrub
Fieberiella septentrionalis	Wath upon Dearne	SE4401	63	4	7	12.viii.2013	JF	JF	Sweeping	*Salix* cinerea
Fieberiella septentrionalis	Canvey Wick Compensation Area	TQ771833	18		1	22.vii.2014	TB	TB	Sweeping	*Salix* scrub, post-industrial
Fieberiella septentrionalis	Blackheath	TQ3876	16		1	23.viii.2014	RDH	RDH	Sweeping	Grassland with scrub

TB: T Bantock; KB: Krisztina Bleicher; GAC: GA Collins; JF: J Flanagan; RDH: RD Hawkins; PJH: PJ Hodge; AJAS: AJA Stewart; MRW: MR Wilson; NHM: Natural History Museum, London.

they tend to be somewhat disturbed, often ruderal sites or synanthropic ones such as parks, gardens and waste ground between buildings. The records of adults reported in Britain run from early July to late September, a period which is broadly consistent with that in Germany (Nickel, 2003) and denoting a single annual generation. Both species apparently overwinter as eggs laid within the plant tissue. *Fieberiella florii* is known to be a vector of a number of plant diseases, including apple proliferation disease in Europe caused by *Candidatus* Phytoplasma mali, X-diseases of peach in North America (Krczal, Krczal & Kunze, 1989; Tedeschi & Alma, 2006) and apricot chlorotic leaf roll phytoplasma (EPPO, undated). By contrast, *F. septentrionalis* has not been reported as a vector of any similar plant diseases.

Acknowledgements

The authors thank Herbert Nickel, Mike Wilson and Stuart Foster for determination of specimens.

References

Biedermann, R. & Niedringhaus, R. 2009. *The Plant- and Leafhoppers of Germany – Identification key to all species*, WABV.

Bleicher, K., Orosz, A., Cross, J.V. & Marko, V. 2010. Survey of leafhoppers, planthoppers and froghoppers (Auchenorrhyncha) in apple orchards in south-east England. *Acta Phytopathologica et Entomologica Hungarica* **45:** 93–105.

della Giustina, W. 1989. Homoptères Cicadellidae. Vol 3. Compléments aux ouvrages d'Henri Ribaut. *Faune de France* 73. Paris. 350pp.

den Bieman, K., Biedermann, R., Nickel, H. & Niedringhaus, R. 2011. *The Planthoppers and Leafhoppers of Benelux – Identification keys to all genera and all Benelux species not recorded from Germany*, WABV.

EPPO (undated) Apricot chlorotic leafroll phytoplasma. EPPO data sheets on quarantine pests. http://www.eppo.int/QUARANTINE/bacteria/European_stone_fruit/PHYPPR_ds.pdf (accessed 22/02/2015)

Hamilton, K.G.A. 1983. Introduced and native leafhoppers common to the old and new worlds (Rhynchota: Homoptera: Cicadellidae). *The Canadian Entomologist* **115**: 473–511.

Krczal, G., Krczal, H. and Kunze, L. 1989. *Fieberiella florii* (Stal), a vector of apple proliferation agent. *Acta Horticulturae* (ISHS) **235**: 99–106.

Meyer-Arndt, S. & Remane, R. 1992. Phylogenie und speziation der Fieberellini Wagner 1951 (Homoptera: Auchenorrhyncha: Cicadellidae). *Marburger Entomologische Publikationen* **2**: 1–756.

Nast, J. 1987. The Auchenorrhyncha (Homoptera) of Europe. *Annales Zoologici* Warszawa **40**: 535–662.

Nickel, H. 2003. *The leafhoppers and planthoppers of Germany (Hemiptera, Auchenorrhyncha): patterns and strategies in an highly diverse group of phytophagous insects*. Pensoft Publishers, Sofia-Moscow.

Stöckmann, M., Biedermann, R., Nickel, H. & Niedringhaus, R. 2013. *The nymphs of the planthoppers and leafhoppers of Germany*. WABV.

Swenson, K. G. 1974. Host plants and seasonal cycle of a leafhopper *Fieberiella florii* in western Oregon. *Journal of Economic Entomology* **67**: 299–300.

Tedeschi, R. & Alma, A. 2006. *Fieberiella florii* (Homoptera: Auchenorrhyncha) as a Vector of "*Candidatus* Phytoplasma mali". Plant Disease **90**: 284–290.

Wilson, M. R., Stewart, A. J. A., Biedermann, R., Nickel, H. & Niedringhaus, R. 2015. *The planthoppers and leafhoppers of Britain and Ireland*. WABV.

A record of *Trigonaspis megaptera* (Panzer) (Hymenoptera: Cynipidae) from Kent, U.K. – On 18.x.2013 I collected some agamic generation galls of *Trigonaspis megaptera* (Panzer) off the leaves of *Quercus* sp. from Blean Woods, Kent, (TR1059) (Plate 6, Fig. 1). These were the first that I have ever seen and were identified by reference to Redfern, Shirley & Bloxham (2002). The small greenish galls were kidney shaped and were clustered along the main and side veins on the underside of the leaf.

The galls were retained in a well-ventilated and shaded garden shed and were kept over sand which was occasionally moistened. On 18.xi.2014 two agamic females emerged and these were followed by two more on 16.xii.2014. Adult agamic females of this species are wingless and only 2 mm long. Many of the galls failed to produce adults and no parasitoids or inquilines were reared. I have previously found the sexual galls of this species in Scotland, however I failed to find any of these rather more conspicuous galls during a visit in late May 2014 to the area around the collecting site in Blean Wood. I also failed to find any more agamic galls when I visited in October 2014. Redfern ,Shirley & Bloxham (op.cit.) state that *T. megaptera* is uncommon and mainly confined to the north and west of Britain.

Philp (2000) stated that there were old records (prior to 1971) of *T. megaptera* in Kent. I had always assumed that these records were from *The Victoria History of the County of Kent* (1908). I contacted the Kent & Medway Biological Records Centre and they were able to confirm, from a note in the Philp archive, that this was indeed the case.

The records are – for the bisexual generation gall at Wye and Edenbridge (common) and for the asexual generation gall Edenbridge (uncommon). The records were provided by E. J. Lewis.

Some years ago, during a visit to Oxford University Museum of Natural History, I had noticed in passing some specimens of *T. megaptera* from Kent in their collections. The specimens form part of the A. J. Chitty collection donated to the museum in 1908 by his wife. Chitty lived near Faversham, Kent. I recently contacted the museum and the details of these specimens, all of which are of the bisexual fully winged generation, are as follows:

West Blean, Kent 12.vi.1904 [probably A. J. Chitty]
Huntingfield, Faversham, 1900 (date difficult to read) [probably A. J. Chitty]
Charing, Kent, 11.vi. 1904 A. J. Chitty
Chattenden, Kent, 23.vi.1900, Beaumont, Ex. collection Beaumont

I am not aware of any other records of this species in Kent so it would seem that the recent records from Blean Woods are the first for over 100 years.

I thank T. Witts of the Kent & Medway Biological Records Centre and J. Hogan of the Hope Entomological Collections, Oxford University Museum of Natural History for providing me with the historical records of *T. megaptera*. I thank my wife, Sally, for the photograph of the galls of *T. megaptera*. – M. T. JENNINGS, 206 Lower Higham Road, Gravesend, Kent DA12 2NN.

REFERENCES

Page (ed.). 1908. *The Victoria History of the County of Kent* **1**: 111.

Philp, E. G. 2000. Contribution towards the study of plant galls and leaf mines in Kent. Part I. Cynipinae, *Cecidology* **15**: 110–114.

Redfern, M., Shirley, P. & Bloxham, M. 2002, *British Plant Galls, Identification of galls on plants and fungi*, AIDGAP, Field Studies Council.

DICYPHUS TAMANINII (HEMIPTERA: MIRIDAE) NEW TO BRITAIN

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ABSTRACT

The mirid bug *Dicyphus tamaninii* E. Wagner 1951 was discovered at two London sites in 2013 and is now also known from two earlier records dating back to 2008. These are the first records for Britain of this species. The identification of *D. tamaninii* from other British members of the genus is covered in detail and a key to separate it from another recently discovered species, *D. escalerae* Lindberg, is provided.

INTRODUCTION

Three males of a *Dicyphus* species (Hemiptera: Miridae) were swept on 23rd August 2013 by the author from vegetation on disturbed ground in Crystal Palace Park, London Borough of Bromley (TQ348708, West Kent VC 16). By 25th August, following an exchange of emails and photographs with Tristan Bantock, the specimens were named as *Dicyphus tamaninii* E. Wagner, a species apparently new to Britain. The vegetation from which the specimens were swept included goosefoot *Chenopodium*, dock *Rumex*, knotweed *Persicaria* and willowherb *Epilobium*.

On 3rd September 2013, a male and four females of *D. tamaninii* were swept from derelict land at Silvertown Quays, London Borough of Newham (TQ413802, South Essex VC 18). Four of the specimens were swept from a stand of great willowherb *Epilobium hirsutum* L. The remaining female was swept from an adjacent mound of soil, covered with ruderal plants, including black nightshade *Solanum nigrum* L., tomato *Solanum lycopersicum* L., bittersweet *Solanum dulcamara* L., *Chenopodium*, orache *Atriplex*, annual mercury *Mercurialis annua* L. and sunflower *Helianthus*. Large numbers of *Dicyphus errans* (Wolff) were sampled from black nightshade (though absent from tomato and bittersweet) amongst which the single female *D. tamaninii* was found.

Two earlier British records of *D. tamaninii* have subsequently come to the author's attention. Specimens, tentatively identified at the time as *tamaninii*, were captured by Peter Kirby on vegetation on a mound of spoil at Battersea Power Station (c. TQ289774, Surrey VC 17) on 13th May 2008 (Applied Ecology Ltd, 2008). Later, one (a male) was sent to Bernard Nau who dissected it and identified it as *D. escalerae* Lindberg, a species new to Britain (Kirby, Bantock & Nau, 2009). Recently, Peter Kirby (*in litt.*, Feb. 2015) has re-examined his specimens from this survey and found firstly that Bernard Nau's determination as *D. escalerae* was correct, and secondly that he has two other specimens: another *D. escalerae* and a male, now also dissected, of *D. tamaninii*, also new to Britain. Thus we now know that, incredibly, Peter Kirby discovered two species of *Dicyphus* new to Britain in the same sample! Peter Kirby has also found a further single *D. tamaninii* at Dulwich (TQ3373, Surrey VC 17) on 18th August 2012.

IDENTIFICATION

Dicyphus tamaninii belongs to subgenus *Dicyphus sensu stricto* and groups with *D. stachydis* J. Sahlberg and *D. escalerae* as having a slightly smaller body size than

the remaining British members of the subgenus (*pallidus* (Herrich-Schaeffer), *constrictus* (Boheman), *errans* and *epilobii* Reuter) and shorter appendages, notably (i) with hind tibiae less than 2.5mm long (at least 2.5mm in the other four), and (ii) antennal segment 2 shorter, relative to the maximum width of the pronotum.

Dicyphus tamaninii (Plate 6, Fig. 2) more closely resembles *D. escalerae* (Plate 6, Fig. 3) in having black hairs on the upperside, more raised than the brownish hairs of *D. stachydis*. Both *D. tamaninii* and *D. escalerae* are similar in size and share very obvious black marks on the wings, making them look spotty compared to most other *Dicyphus* species. The keys to the fauna of France (Wagner & Weber, 1964) distinguish *D. escalerae* from *D. tamaninii* only by the former having a smaller vertex width: eye width ratio (i.e. narrower vertex, wider eyes) and an obviously different left clasper. However, from observations of British specimens of both species, it seems there are a range of characters which should allow confident determination of females and undissected males, as presented in the following couplet.

Antennal segment 1 pale with dark rings in the basal and apical thirds. Antennal segment 2 predominantly pale with dark rings in the basal and apical quarters. Femora, especially the hind femora, narrower and more elongate; usually more finely dark-spotted, the spots not coalescing. Tibiae entirely pale. Paired dark marks on the vertex of the head, separated by a pale median line. The dark markings on head, thorax and abdomen generally weaker and less extensive. Body more elongate overall, with noticeably more elongate pronotum. Left clasper of male as in Fig. 1.
. . . . . ***Dicyphus tamaninii*** E. Wagner (body length c. 4 mm).

Antennal segment 1 predominantly dark without a pale ring in mid-segment. Antennal segment 2 predominantly dark with a pale ring in the middle third. Femora, especially the hind femora, broader and less elongate; more coarsely dark-spotted, the spots often coalescing. Tibiae with a dark ring at the base and with scattered dark markings in the basal half. Dark markings on the vertex of the head coalesced into a single mark. The dark markings on head, thorax and abdomen generally bolder and more extensive. Body less elongate overall, with noticeably more transverse pronotum. Left clasper of male different (see Wagner & Weber (1964)).
. . . . . ***Dicyphus escalerae*** Lindberg (body length c. 4 mm).

Fig. 1. Left clasper of the male *Dicyphus tamaninii* in Plate 6, Fig. 2, with the minutely dentate crest arrowed.

For certain determinations, it will still be worth examining the shape of the left clasper of male *Dicyphus* and comparing to the illustrations in Wagner and Weber (1964) which illustrates all British members of the genus.

Using Wagner and Weber (1964), the species most easily confused with *D. tamaninii* would be *D. bolivari* Lindberg, a species known from France, Spain and the Canary Islands (http://www.faunaeur.org). Though similar, the left clasper of the London specimens most closely matches *D. tamaninii*, possessing a minutely dentate crest (arrowed in Fig. 1), though not as strongly or extensively dentate as illustrated by Wagner and Weber (1964). The description of the upperside pubescence of *D. tamaninii* as "black, very strong" also matches the London specimens, compared to the "fine, brown" pubescence of *D. bolivari* (as also in *stachydis*).

Both *D. tamaninii* and *D. escalerae* are usually macropterous but brachypterous specimens of both have been found in Britain.

Ecology and status in Britain

Dicyphus tamaninii is a predator of whitefly, aphids and thrips that can be found on a range of crops in southern Europe including tomatoes and cucumbers. Much of the research on this species focuses on its use or potential use as a biological control agent on greenhouse crops of tomatoes and cucumbers. There appear not to have been any official importations of *D. tamaninii* into Britain but this does suggest a potential pathway of introduction from the continent. *Dicyphus tamaninii* should be treated as a non-native species in Britain.

The occurrence of *D. tamaninii* at four different London sites, and in numbers at two of those, suggests that it has already become established in Britain. It is predicted to spread and become more firmly established, so will probably be found more often and more widely in future.

The four British records reported here suggest that *D. tamaninii* should be looked for by sweeping great willowherb as well as by general sweeping of tall, ruderal vegetation in open, disturbed habitats such as on derelict land.

World distribution

The natural range of *D. tamaninii* is centred on the western Mediterranean, being recorded from southern France, mainland Spain, mainland Italy and Tunisia, extending eastwards to Croatia, Bosnia-Herzegovina, Crete and Israel (Wagner & Weber, 1964; Aukema & Rieger, 1999; http://www.faunaeur.org).

Acknowledgements

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References

Applied Ecology Ltd. 2008. *Battersea Power Station. Ecology survey*. Report for URS Corporation Ltd. https://www.tfl.gov.uk/cdn/static/cms/documents/nle-twa-environmental-statement-volume-iid-appendix-j-part-2-a17-5b.pdf

Aukema, B. & Rieger, C. 1999. *Catalogue of the Heteroptera of the Paleaearctic Region Vol. 3. Miridae*. Leiden: Nederlandse Entomologische Vereniging.

Kirby, P., Bantock, T. M. & Nau, B. S. 2009. *Dicyphus escalerae* Lindberg, 1934. *Het News* (Spring 2009) **13**: 7–8.

Wagner, E. & Weber, H. H. 1964. *Faune de France, 67. Hétéroptères Miridae*. Paris: Fédération Française des Sociétés de Sciences Naturelles, Office Central de Faunistique.

SHORT COMMUNICATIONS

A record of *Adelphocoris seticornis* (F.) (Hemiptera: Miridae) from southern Scotland. – On 16th August 2013 I swept three specimens of *Adelphocoris seticornis* (F.) from tall herbs fringing the northern edge of Gordon Moss (NT6342, VC 81, Berwickshire) in the Scottish Borders. Gordon Moss largely consists of willow carr with more open herbaceous vegetation on the northern margin. *Adelphocoris seticornis* was swept from this herbaceous vegetation with *Centaurea nigra* L., *Chamerion angustifolium* (L.) Holub, *Heracleum sphondylium* L., *Cirsium arvense* (L.) Scop., *Urtica dioica* L., *Filipendula ulmaria* (L.) Maxim., *Angelica sylvestris* L. and *Cirsium palustre* (L.) Scop.

The Hemiptera collections and the Scottish Insects Records Index at the National Museums of Scotland in Edinburgh were consulted. This search disclosed only one previous Scottish record of *A. seticornis*, which is from Longforgan, near Dundee in Perthshire (Hill, 1947). According to Kirby (1992a, 1992b, 1996) *A. seticornis* has a wide but scattered distribution in Britain with records from eight counties in England from Yorkshire southwards, three in Wales and one in Scotland. Kirby (1992a) also notes that the species is chiefly associated with tall vegetation in damp places and the food plants are members of the Fabaceae. – D. Horsfield, National Museums Collection Centre, 242 West Granton Road, Edinburgh EH5 1JA.

References

Hill, A. R. 1947. *Adelphocoris seticornis* (F.) (Hem., Miridae) new to the Scottish Insect Fauna List. *Entomologist's Monthly Magazine* **83**: 12.

Kirby, P. 1992a. *A review of the scarce and threatened Hemiptera of Great Britain*. UK Nature Conservation. No. 2. Peterborough, Joint Nature Conservation Committee.

Kirby, P. 1992b. Heteropterists' Field meeting 1991: Carmarthenshire. *Heteroptera Study Group Newsletter* **11**: 8–10.

Kirby, P. 1996. News Digest. *Heteroptera Study Group Newsletter* **13**: 1–2.

***Platynaspis luteorubra* (Goeze) (Coleoptera: Coccinellidae) goes arboreal** – On 21st April 2014 I beat a single adult *P. luteorubra* from a black pine *Pinus nigra* at Brooklands, Surrey (TQ0662), which I thought unusual as all seven of my previous encounters with this scarce ladybird had been at ground level on path edges and in suction samples close to *Lasius niger* (L.) nests. On the 9th April 2015 I revisited the site and beat nine adult *Platynaspis* from four different pines on branches between 50cm and 1.5m off the ground. It seems likely that they are using the evergreen cover as hibernation sites, and the surrounding old runway areas provide plenty of suitable breeding habitat. Tony Allen has informed me that he has also recorded *P. luteorubra* on pines at Brooklands and once on Scot's Pine *Pinus sylvestris* in Dorset. – Jonty Denton, 31 Thorn Lane, Four Marks, Hants GU34 5BX.

2014 ANNUAL EXHIBITION

Conway Hall, Red Lion Square, Holborn, London WC1R 4RL

8 November 2014

This year the Society's Annual Exhibition moved to Holborn in central London. Conway Hall in Red Lion Square was chosen for the convenience of its central city location, very low cost (a significantly important factor) and the fact that Council is familiar with the building as it regularly uses rooms there for committee meetings. Almost identical numbers of members and guests attended the 2014 exhibition as in the previous year at Kempton Park on the southern outskirts of the city (c.180).

The slightly increased travel times into the very centre of London, attendant costs and the difficulties of carrying highly prized exhibits on a crowded underground railway were seemingly more than offset by the delightful hall itself which meant that everybody was nicely packed in and you could not help but talk to fellow members as you passed to and fro along the aisles looking at exhibits (Fig. 1). By the volume of sound generated it was clearly a very successful social occasion! Some members likened it to when the exhibition was held at Chelsea Old Town Hall many years ago. Exhibitors were allowed in from approximately 10am to arrange their exhibits and to

Fig. 1. The Society's Annual Exhibition in full flow: the main conference room, Conway Hall, Holborn, November 2014. Photo: Tony Pickles.

put up display boards. Pemberley Books was allocated a stall on the periphery so that members had the opportunity to peruse a wide selection of new and secondhand books on entomology and related natural history topics. The doors were opened to members at 11am as usual and there was quite a rush to get inside. A little time later the President Claudia Watts declared the exhibition officially open. The following accounts of the exhibits were compiled by the recorders: Aaron Jones (British Butterflies), Sean Clancy (British Macrolepidoptera), Richard Dickson (British Microlepidoptera), Colin Plant (Foreign Lepidoptera), Peter Chandler (Diptera), Peter Hodge (Coleoptera), Tristan Bantock (Hemiptera) and Andrew Halstead (Hymenoptera). John Badmin and Glenda Orledge compiled the reports on 'Other Orders and General' including posters. Our photographer, Alec Harmer had a separate room to himself at the back of the stage to set up his equipment and this proved highly successful. David Wilson once again agreed to process the images for the journal using the latest software techniques. The joint operation was a complete success and the cost of printing the colour plates in the journal was covered by a grant from the Hammond Memorial Fund. Light refreshments for attendees were available all day in the hall foyer just outside the exhibition room and the exhibition closed around 5 pm.

In the evening about thirty members and guests attended the Society's Annual Dinner at the Spaghetti House restaurant a few blocks away (Fig. 2). This was a truly excellent choice and a memorable meal and our thanks once again go to Rosemary Hill who masterminded the whole day.

Fig. 2. The Society's Annual Dinner at the Spaghetti House, Holborn: clockwise from Rosemary Hill, Jon Cole, Andrew Halstead, Ian Masters, Ian Sims, Peter Verdon, Keith Bland and Gerry Tremewan. Photo: Tony Pickles.

BRITISH BUTTERFLIES

BAILEY, K. E. J. – Results of breeding and temperature experiments up to October 2014 including non-British species.

A hybridization experiment between female *Papilio machaon gorganus* Frustorfer (German origin) and male *Papilio polyxenes* F. (U.S.A). Male and female hybrids from hand-pairings, the hybrids expressed characters with great similarity to *polyxenes*, the exhibitor believes these characters to be dominant and carried in the autosomes as opposed to the mitochondrial DNA. One female hybrid was asymmetrical possibly resulting from a binucleate ovum.

Anthocharis cardamines britannica (Verity), intersex specimens showing similar expression to that figured from the 2013 exhibition, having orange speckling along the nervures on otherwise female butterflies. These were induced by an identical technique to that described in that exhibition report except that larvae pupating on plant stems were removed in situ on each stem as pre-pupae without disturbance, held by a pin on a solid background. The actual pupation time was more easily observed. In total 15% of all pupae emerged as intersexes. It appears that this intersex is a valid and repeatable phenomenon, the livestock used for the experiment being unrelated wild collected stock from north Buckinghamshire. The exhibitor has tentatively described this as ab. *aureoradiata* Bailey with the original specimen being the holotype. Further work is in progress.

Colias alfacariensis Ribbe, a series of aberrations that appeared analogous to *Colias croceus* (Geoffroy) ab. *nigrofasciata* Verity and *Colias hyale* (L.) ab. *nigrofasciata* Grum-Grshimailo with suffusion and extension of dark markings from the forewing apex and margin towards the discoidal spot. These were induced by the same techniques as that described for *C. croceus*, in the 2013 exhibition report. The exhibitor believes this form is repeatable and that other species of Coliadinae may respond similarly. All specimens bred ex wild female from Lot France, May 2014.

Clossiana selene (D. & S.), a series of strong melanic aberrations induced by cold / heat shocks, ex wild female, north west England, June 2014 (Plate 7, Fig 8). *Melitaea athalia* (Rott.), a historic wild caught specimen taken in Kent in 1966 by H. G. Short, with strongly melanic forewings (Plate 7, Fig 7), and an obsolete example taken by the exhibitor in Creuse, France, May 2014.

Pararge aegeria tircis (Godart), a short series of aberrations induced by rearing stock in abnormal warmth during January–March 2014. It has been found that individuals of the most extreme ab. *cockaynei* Goodson have difficulty eclosing satisfactorily owing to an inability to gain a proper foothold to allow wing expansion. All bred ex North Buckinghamshire stock.

DICKERSON, B. – Six pages from the proposed book *Butterflies and Moths of Huntingdonshire* (VC 31), showing the page layout and the information included for each species with maps of distribution within the county. The aimed publication date is late 2016 or early 2017 and the author requests any records for Huntingdonshire be sent to him for inclusion by December 2015.

HARMER, A. S. – A short series of *Lysandra bellargus* (Rott.), ab. *discoidalisnulla* Tutt, bred from three females, captured during 2013 in Dorset, where the aberration is not uncommon in the Purbecks. No previous studies into the genetics of this subtle aberration appear to be recorded in the literature. Pairings obtained the following year resulted in a F_2 generation comprising: 51 typical males, 47 typical females, 10 *discoidalisnulla* males and 21 *discoidalisnulla* females, producing a ratio of 3.16:1, strongly agreeing with the anticipated 3:1 for a simple Mendelian recessive gene, and

confirmed when the Chi-Square Test was applied (with the probability level of 0.05 and one degree of freedom, the chi-square value was 0.0645 – less than the critical value of 3.841, thus confirming that the genetic theory was correct). The aberration was very clear-cut with no intermediate forms. (Plate 7, Figs 4 & 5).

JONES, A. M . – *Pieris brassicae* (L.), heavily spotted ab. *infra-fasciata* Gr.-Smith, bred in an F_3 generation. The stock originated from wild ova gathered near Berrylands, Surrey in September 2013, the F_1 emerged in May 2014 and comprised 75 butterflies, 15 male and 4 female type specimens, 3 light *infra-fasciata* males and 13 heavily spotted but light *infra-fasciata* females. Selected pairings gave an F_2 in June/July of 75, comprising, 12 type males, 22 light *infra-fasciata* males and 4 heavily spotted light *infra-fasciata* male, 25 light *infra-fasciata* females and 12 heavily spotted *infra-fasciata* females. A partial F_3 in late July/August comprised 115, 4 type males, 47 (24 heavily spotted) minor *infra-fasciata*, 5 good *infra-fasciata males*, 37 (24 heavily spotted) light *infra-fasciata* females and 22 good *infra-fasciata* females. It would seem that *infra-fasciata* in its broadest sense is dominant, with a variable expression, it is hoped to continue investigation with this stock. F_3 and F_4 pupae are currently over-wintering.

Pieris rapae (L.), a short series of female ab. *fasciata* Tutt – ab. *conjugata* Verity and a mixed gynandromorph, bred November 2013 in an F_1 generation. The stock originated from a crippled, heavily marked female that emerged from ova collected in the exhibitor's garden in Kingston upon Thames, Surrey, and paired with a typical male from the same source.

The brood comprised 101 butterflies, 16 male and 12 female type specimens, 32 males and 25 females were light *fasciata*, 13 females were good *fasciata* and 2 females were good ab. *conjugata*. The mixed gynandromorph, emerged 18.xi.2013 was a very light *fasciata*. No pairings were observed and all ova laid were infertile.

Gonepteryx rhamni (L.), an extreme mixed gynandromorph, bred ex wild larvae from Surrey, emerged 16.vi.2014 (Plate 7, Fig 1).

Argynnis paphia (L.), a bilateral gynandromorph, bred in an F_1 brood from a Surrey ab. *valesina* Esper, female. The brood was small and comprised 34 butterflies, 16 males, 8 type females, 9 *valesina* females and one 'type' gynandromorph, left side male. Emerged 16.v.2014.

REVELS, R. C. – *Lysandra coridon* (Poda.), a female aberration approaching ab. *alba* B & L. This was found at rest during a quick visit to a small Bedfordshire colony, its bright underside made it stand out amongst the typical butterflies in the late evening sunlight (Plate 7, Fig 6).

YEATES, M. A – Results of breeding experiments during 2014 with *Aglais io* (L.).

Ab. *fischeri* Standfuss induced by cold storing 6 hour old pupae for 21 days at 10°C. The larvae were reared inside on cut food-plant in a 16-hour artificial daylight at a constant 18°C and then cold-stored shortly after pupation. Some pupae were removed after only 4 days and produced normal butterflies. The remaining pupae left in the cold and dark for 21 days and then brought back into the artificially ambient environment, were all *fischeri*. This is a repeat of a well-known method but using a slightly higher temperature than previous experimenters (e.g. K. E. J. Bailey at 4°C). It was found that 10°C could stop (or fully suspend) larval development with continuation immediately on return to normal ambient conditions. About half the resulting adults had depleted blue in the hindwing ocellus, approaching ab. *nigrocellata* Reuss in which all blue is absent. The exhibitor noted that of the few *nigrocellata* he has examined, all seem to have extra forewing marginal spots characteristic of ab. *fischeri*.

Ab. *prochnovi* Pronin induced with microinjections of (0.2µl) of a 1M solution of sodium tungstate to pupae at 42 hours old. The larvae were reared inside on cut food-plant in a 16-hour artificial daylight at a constant 18°C before injection. The ab. *prochnovi* appeared in varying expressions within a timing range of 42 ± 2 hours, this was an unexpectedly late effect. Outside this time window with injections from 24 to 72 hours (at 6 hour intervals), all were normal. This form differs from the well-known ab. *belisaria* Oberthur, which has a similar forewing aberration but with no hindwing ocellus, ab. *prochnovi* being characterised by having fairly typical hindwings. The experiment was repeated on three different larval broods with similar results. A few of the adults in one brood had much blue in the hindwing ocellus characteristic of ab. *splendens* Reuss and it is thought this could be genetic in origin (Plate 7, Fig 2).

British macromoths

Brotheridge, D. – A number of specimens of interest taken by various recorders in Wiltshire; these included the first, probably adventive, British specimen of *Idaea elongaria* (Rambur) taken at Covingham (VC 7) on 19.vi.2012 (leg. W. Clinch; Plate 8, Fig 6); minor aberrations of *Idaea aversata* (L.) and *Eilema depressa* (Esp.); an aberrant example of *Macaria notata* (L.) from Farley on 21.viii.2014 leg. L. Evans (the exhibitor stated this moth had been determined by dissection; it was of a form known in the congener *M. alternata* (D. & S.) but previously unknown in *M. notata*; (Plate 8, Fig 11); and a strikingly suffused *Ochropleura plecta* (L.) taken at Longbridge (VC 8) (leg. R. Creighton; Plate 8, Fig 16).

Clancy, S. P. – A selection of interesting immigrant species and forms recorded or bred from East Kent (VC 15) during 2014 as follows: *Idaea biselata* (Hufn.), a possibly unique, uniformly brown form from Orlestone Forest on 7.vii.2014 (leg. J. Knowler; Plate 8, Fig 10); *Cyclophora ruficiliaria* (H.-S.), two spring brood examples bred from an immigrant female taken at Ruckinge on 9.viii.2013; *Lomaspilis marginata* (L.), an exceptionally white, unmarked example taken at Dungeness on 26.vii.2014; *Pungeleria capreolaria* (D. & S.), the fourth British example of this species taken at Greatstone on 8.vi.2014, exhibited with two examples reared on *Picea abies* from the original female; *Tyria jacobaeae* (L.), a previously unknown melanic form taken at Dungeness on 10.vi.2014 (Plate 8, Fig 12); *Eilema depressa* (Esp.), examples taken at Dungeness on 19.ix.2014 and Greatstone on 27.ix.2014, with a comment that the three autumn records in 2014 in the area were likely to relate to immigrant, second-brood examples; *Aedia funesta* (Esp.), the first British example of this species from Kingsdown on 13.vi.2014 (leg. N. Jarman; Plate 8, Fig 15); *Chloantha hyperici* (D. & S.), the eleventh British example of this species from Dungeness on 13.ix.2014 (the first from the Dungeness area since the first British record there in 1996); *Omphaloscelis lunosa* (Haw.), a striking aberration with a series of black subterminal markings on fore and hindwings, from Dungeness on 1.x.2014 (only three examples of this aberration have been recorded in Britain, all from Dungeness; Plate 8, Fig 17); *Enargia paleacea* (Esper), an immigrant example taken at Sissinghurst on 19.vii.2014 (leg. S. Broyd); *Agrotis exclamationis* (L.), two dark and unusually marked female examples from Tenterden on 18.vi.2014 and Dungeness on 10.vii.2014.

Also shown was an example of the *expolita* race of *Photedes captiuncula* (Treitschke) taken at light by the exhibitor from the new locality for the species of Whitbarrow Scar, Cumbria (VC 69) on 27.vii.2013.

CLARKE, J. H. – A selection of local forms from the Outer Hebrides including *Perizoma blandiata perfasciata* (Prout) and specimens conforming to *Dysstroma truncata concinnata* (Stephens). Also shown were aberrations of *Opisthograptis luteolata* (L.) (exhibiting an exagerrated central fascia) from VC 9, and the melanic form of *Odontopera bidentata* (Clerck) from VC 13. Notable immigrants shown included an example of *Lacanobia spendens* (Hübn.) from VC 10 on 1.vii.2014; bred examples of *Eupithecia venosata fumosae* (Gregson) and *Hadena confusa* (Hufn.) ab. *obliterae* (from Shetlands) and *Xestia ashworthii* (Doubleday.) (from N.W. Wales) were also exhibited.

COOK, R. – A dark example of *Laspeyria flexula* (D. & S.) taken in Ferndown, Dorset (VC 9) on 14.vi.2014; exhibited with two typical examples of the species for comparison.

DAWSON, J. R. – A number of specimens of interest taken by various recorders in Cambridgeshire (VC 29); these included the first VC records of *Hypena crassalis* (F.) from Fulbourn on 10.vii.2010, and *Lacanobia splendens* (Hübn.) taken on 26.vii.2013 (leg. J. Lindsell; no site given); details were also given of county records of *Calophasia lunula* (Hufn.) and *Cryphia algae* (F.) which were both recorded for the first time in VC 29 during 2010 and now breed locally; and *Lithosia quadra* (L.) from Fulbourn on 16.ix.2014.

Also shown was a photograph of what was stated to be a strongly marked *Spilosoma lubricipeda* (L.) recorded by C. Thurgood at Trumpington, Cambridgeshire on 13.v.2014, but was in fact the first British record of *Hyphantria cunea* (Drury) (see Plant & Sale exhibit).

GILL, N. – A number of specimens of *Pseudocoremia suavis* Butler taken during 2014 near Helston, Cornwall (VC 1), a New Zealand endemic, now very locally established in this area (Plate 8, Fig 8). Also examples of *Xestia alpicola alpina* (H. & W.) bred from pupae collected in Aberdeenshire (VC 92).

HALL, N. M. – A varied exhibit of moths that included the first VC 23 record of *Lacanobia splendens* (Hübn.) from Hartslock NR on 19.vii.2014 along with some discussion about the identification of this species; among other specimens of interest exhibited were examples of *Moma alpium* (Osbeck) from Horton Heath, Dorset on 24.vi.2014, *Hypena rostralis* (L.) from Salisbury, Wiltshire on 2.vi.2014, *Furcula bicuspis* (Borkh.) from Hastings CP, East Sussex on 15.vi.2014, and *Hydraecia petasitis* (Doubleday) from Thatcham, Berkshire on 18.vii.2014, with a comment that *H. petasitis* had been recorded from three sites in west Berkshire during 2014. Also shown were several *Rhizedra lutosa* (Hübn.) illustrating the wide range of variation found within this species.

HART, C. – An exhibit that showed short bred series of *Perizoma blandiata* (D. & S.) and *Perizoma minorata* (Treitschke) reared from small larvae collected with foodplant at Cairngorm, Inv. (VC 96) in August 2013. These included the striking and probably unique aberration of *P. blandiata* figured on Plate 8, Fig 7.

Other species exhibited included *Macrochilo cribrumalis* (Hübn.) from the exhibitor's garden in Buckland, Surrey in June 2014, and *Cyclophora puppillaria* (Hübn.) from the Lizard, Cornwall on 19.ix.2014 (with mention of a second at Buckland, Surrey on 29.x.2014).

HAYWARD, R. – An exhibit featuring species and forms of interest from several localities, including two *Rhodometra sacraria* (L.) taken from the exhibitor's garden in Wokingham (VC 22) on 30.viii. & 6.ix.2014 (with a third recorded on 30.x.). Also from this site, six species were exhibited that were new to the site in 2014 taking the total number of macromoths recorded during eight years' trapping to 374.

Also featured were a selection of interesting moths taken during a trip to East Anglia in late July 2014; these included *Pelosia muscerda* (Hufn.) and *Pelosia obtusa* (H.-S.) from Hickling (VC 27), and *Noctua orbona* (Hufn.), *Cryphia algae* (F.) and *Luperina nickerlii demuthi* (G. & S.) from Bawdsey (VC 25). Also shown were male and female examples of typical and ab. *concolor Calliteara pudibunda* (L.) with a comment that the proportion of the dark form in the female seems far lower than in the male.

HENWOOD, B. – An exhibit featuring photographs of larvae of *Photedes captiuncula* (Treitschke) and *Aporophyla luenebergensis* (Frey.) found in the Burren (VC H9) during May 2014, and *Coenophila subrosea* (Stephens) larvae found in Cors Caron NNR, Cardiganshire (VC 46) on 1.vi.2013.

JENKINS, A. – An example of the banded form of *Chloroclysta siterata* (Hufn.) from Durlston, Dorset (VC 9) on 28.x.2014; a striking, suffused form of *Crocallis elinguaria* (L.) from Wicken Fen, Cambridgeshire (VC 29) on 26.vii.2014 (Plate 8, Fig 14) and a female *Lymantria dispar* (L.) bred from larvae found on lime trees in Westminster, London (VC 21), in July 2014.

KNILL-JONES, S. A. – A selection of interesting species and forms taken in the exhibitor's garden at Totland, Isle of Wight (VC 10) during 2014 that included the first VC record of *Syngrapha interrogationis* (L.) taken on 25.vii., and examples of *Catarhoe rubidata* (D.&S.) on 2.vii., *Hypena rostralis* (L.) on 13.vi., *Spodoptera exigua* (Hübn.) on 31.x., and *Lacanobia splendens* (Hübn.) on 25.vi. & 7.vii.

LANGMAID, J. R. – The first British specimen of *Pungeleria capreolaria* (D.&S.) taken on 18.v.2014 (see also Owen & Clancy exhibits) and a unique, purple-suffused aberration of *Cyclophora puppillaria* (Hübn.) taken on 23.ix.2013, both from Bracklesham Bay, Sussex (VC 13) and exhibited on behalf of the captor D. Lee. From Southsea, Hampshire (VC 11), a strongly marked *C. puppillaria* taken on 3.ix.2014, an obscurely marked *Bryophila domestica* (Hufn.) taken on 19.vii.2014, and a specimen of *Caradrina clavipalpis* (Scop.) exhibiting a claviform stigma taken on 12.viii.2014 and confirmed by dissection.

LOCK, J. A. – An exhibit detailing the status and control measures associated with the introduced population of *Thaumetopoea processionea* (L.) present in the London area. This included the information that 4,000 larval nests were removed from Richmond Park (VC 17) in 2013, with a further 8,000 removed in 2014. The need to balance this direct eradication programme with the encouragement of parasitoids as a natural population control of *T. processionea* was also discussed.

MASTERS, I. D. – From Middleton-on-sea, Sussex (VC 13), specimens of *Nola aerugula* (Hübn.) taken on 23.vii.2013, and *Apamea sublustris* (Esper) taken on 27.vi.2014, both new to the recording site; also shown was an asymmetrically marked *Cosmorhoe ocellata* (L.) taken at the same site on 6.vi.2014.

MCCORMICK, R. F. – Records of interest from Devon (VC 3/VC 4) during 2014 sourced from various recorders, the specimens shown not necessarily being those recorded during the 2014 season. The most significant of these was the third British and first Devon record of *Stegania cararia* (Hübn.) taken at Parke on 25.vii.2014. Also shown were examples of *Hyles gallii* (Rott.) from Christow, 28.vii.2014 (leg. R. Parkin; last county record 1995); *Cyclophora porata* (L.) from the Rothamsted light at Starcross, 2-6.vi.2014 (last county record in 2010); *Parascotia fuliginaria* (L.), Plymouth, 8.vii.2014 (leg. C. Coomber; last county record 2007); *Trachea atriplicis* (L.), Ottery St. Mary, 27.iii.2014 (leg. R. Green; last county record 2006); *Cryphia algae* (F.), Plymouth, 27.vii.2014 (leg. S. Green; fourth county record); and *Lacanobia splendens* (Hübn.), Axminster, 26.vii.2014 (leg. O. Woodland; second county record).

OWEN, J. E. – Exhibited were four macromoth species new to the exhibitor's garden near Dymchurch, Kent (VC 15) during 2014: *Trichopteryx polycommata* (D. & S.) on 2.iv.; *Pungeleria capreolaria* (D. & S.) on 20.v. (the second British specimen, Plate 8, Fig 18); *Pechipogo plumigeralis* (Hübn.) on 21.vii. & 19.ix.; and *Eilema caniola* (Hübn.) on 23.ix. These bring the total number of macromoths recorded from this long-standing recording site to an impressive 540 species.

PHILLIPS, J. W. – An exhibit showing a small selection of plusiids taken from the exhibitor's garden in Northney, Hayling Island, Hampshire (VC 11) that included an example of *Autographa gamma* (L.) ab. *nigricans* and a specimen of *Trichoplusia ni* (Hübn.).

PLANT, C. W. & SALE, B. – An exhibit showing a male example of *Hyphantria cunea* (Drury) taken in Stevenage, Hertfordshire (VC 20) on 29.ix.2014 (leg. B. Sale; Plate 8, Fig 13). This moth was exhibited as the first and only British record of this species but was pre-dated by an example exhibited erroneously as a photograph of an aberrant *Spilosoma lubricipeda* (L.) taken in Cambridgeshire (VC 29) (see Dawson exhibit). These records may indicate local breeding but the species has almost certainly an adventive origin in Britain.

SCANES, J. & BATTEN, A. – A joint exhibit that included the following scarce immigrant species taken at sites in East Sussex (VC 14): the third VC record of *Chiasmia aestimaria* (Hübn.) from Ringmer on 7.viii.; the first VC record of *Catocala nymphagoga* (Esper) from Bexhill-on-sea on 22.vii (leg. K. N. Alexander); and two *Chrysodeixis chalcites* (Esper) from Holywell, Eastbourne on 28.viii. Additional specimens shown from a number of localities visited during the 2014 season included two *Lygephila craccae* (D. & S.) bred from larvae found at Hartland Point, Devon (VC 4) during June, and an example of *Lasiocampa trifolii flava* Chalmers-Hunt ab. *obsoleta* from Rye Harbour (VC 14) on 25.vii.

SIMS, I. – An exhibit that showed a number of species of interest recorded in Berkshire (VC 22), the most notable of these being *Eilema caniola* (Hübn.) on 10.vii.2012 & *Cryphia algae* (F.) on 27.vii.2014, both from Winnersh (leg. J. Cole), and an example of *Diachrysia chryson* (Esper) from the new site of Dinton Pastures Country Park, Hurst, Reading, on 28.vi.2014.

TERRY, R. – Four examples of the genus *Gymnoscelis* not conforming with typical *G. rufifasciata* (Haworth) both in terms of external characters or genitalia structures. The specimens exhibited were taken in Liverton (VC 3) on 20.iv.1976 (leg. B. Skinner), Greenford (VC 21) on 15.iv.2011 (leg. D. Howdon), Bonchurch (VC 10) on 5.v.2011 (leg. J. Halsey), and Wood Green (VC 21) in vi/vii.2010 (leg. M. Ashby). As *G. rufifasciata* is the only member of this genus known in Europe, a request was made by the exhibitor for more specimens to increase the sample size and clarify whether these anomalies indicate the presence of a second *Gymnoscelis* species in Britain or are the result of natural variation within *G. rufifasciata*.

Also exhibited, two species of note from Middlesex: *Perizoma albulata* (D. & S.) from Greenford on 1.vi.2014 (leg. A. Culshaw; first VC 21 record since 1940), and *Orthosia miniosa* (D. & S.) from Greenford on 2.iv.2014 (leg. D. Howdon; first VC 21 record since 1967).

WILSON, D. E. – An exhibit that included the third British and first Suffolk specimen of *Eucarta virgo* (Treitschke) taken in the exhibitor's garden at Blythburgh, Suffolk (VC 25) on 24.vii.2014; also from the same site a dark example of *Amphipyra tragopogonis* (Clerck) taken on 26.vii.2014. Also shown was an exceptional, suffused form of *Coenophila subrosea* (Stephens) bred from a larva collected at Borth Bog, Cardiganshire (VC 46) in July 2014 (Plate 8, Fig 19).

British microlepidoptera

Beavan, Miss S. D. & Heckford, R. J. – *Phyllonorycter kuhlweiniella* (Zeller), Langmere, Norfolk TL912886 (VC 28) 18.v.2014, one adult found amongst moss on the ground. *Agonopterix curvipunctosa* (Haworth), Thorpeness, Suffolk TM4759 (VC 25) larvae in spun leaves of *Anthriscus caucalis* M. Bieb 16.v.2014, moths reared 9 & 19.vi.2014. Apparently new Suffolk locality and possibly only third in the county. *Syncopacma vinella* (Bankes), Isle of Wight (VC 10) larva in spun leaves of *Genista tinctoria* L. 25.vi.2014, moth reared 18.vii.2014. Previously only known from four or five localities in Sussex, not seen at its last known locality there since 1990 and was believed to be extinct in the British Isles until 2013 when the exhibitors found larvae at one site on the Isle of Wight. In 2014 larvae were found at two other sites on the Isle of Wight. *Eulamprotes wilkella* (L.), Icklingham, Suffolk TL768735 (VC 26) larvae in spun tubes amongst *Hypnum lacunosum* (Brid.) Brid. var. *lacunosum* 14.v.2014, two moths reared 5 & 30.vi.2014, each with only two silvery fasciae on the forewings but one having the third, outer, fascia obsolete and the other having the second, middle, fascia obsolete; Winterton-on-Sea, Norfolk TG4920 (VC 27) larvae in spun tubes amongst *Dicranum scoparium* Hedwig 15.v.2014, moths reared 20.vi & 8.vii.2014. Both moss species are new foodplants. Dr P. H. Sterling found larvae feeding on the moss *Syntrichia ruraliformis* (Besch.) Cardot at two sites in 2006 and 2007 but on no other moss species. Discovery of larvae feeding on two other moss species supports his suggestion that *Cerastium fontanum* (Baumg.) may be an atypical foodplant. *Chionodes distinctella* (Zeller), Winterton-on-Sea, Norfolk TG492201 (VC 27) larvae amongst *Dicranum scoparium* (but not in tubes) 15.v.2014, in captivity they ate leaves of *Rumex acetosella* L., moths reared 22 & 30.vi.2014. Only the second time that the larva has been recorded in the British Isles. The first was by the exhibitors in 2013 at Findhorn, near Forres, Moray NJ049645 (VC 95) where the larvae were in sand-covered silken tubes attached to *Syntrichia ruralis* (Hedwig) F. Weber & D. Mohr ssp. *ruraliformis* but feeding on leaves of *Lotus corniculatus* L.. *Caryocolum alsinella* (Zeller), east of coastal path near Minsmere, Suffolk TM4766 (VC 25) larvae in spun buds/leaves of *Cerastium* ?*diffusum* Pers. 8.v.2014, moths reared 7 & 21.vi.2014 (one confirmed by genitalia examination); Landguard, Suffolk TM2831 (VC 25) larva in spun bud of *Cerastium* ?*semidecandrum* L. 9.v.2014, moth reared 17.vi.2014. Apparently first Suffolk records since 1932. *Lobesia reliquana* (Hübn.), Budshead Wood, Plymouth, Devon SX462598 (VC 3) larva in withered leaf of *Quercus* sp. attached to a twig caught in the lower canopy 3.ix.2013, moth reared 31.iii.2014. The larva fed on the withered leaf. Apparently only the second time that the larva has been found in Britain feeding on withered leaves. The first was in 2009 when two larvae were found by the exhibitors at the same locality feeding on withered leaves of *Quercus* sp. and a moth emerged the following year. *Grapholita compositella* (F.), Isle of Wight (VC 10) two larvae in unexpanded flower buds of *Genista tinctoria* 25.vi.2014, moths reared 11 & 12.vii.2014. *Genista tinctoria* is not one of the foodplants given in British or mainland European literature. The larva of the very rare *Grapholita lathyrana* (Hübn.) is similar in appearance and also feeds in unexpanded flower buds of *Genista tinctoria* and so care must be taken if *G. lathyrana* is recorded only in the larval stage. *Musotima nitidalis* (Walker), Hurn Forest, Dorset SU10420085 (VC 11) larva on *Dryopteris dilatata* (Hoffmann) A.Gray 28.xi.2013, moth reared 24.xii.2013. First record of the larva being found in the British Isles (several were found that day both on *Dryopteris dilatata* and *Pteridium aquilinum* (L.) Kuhn and the first moth reared in the British Isles. We are very grateful to Mr D. J. Evans for taking us to the locality.

BLAND, K. P. – *Eudemis profundana* (D. & S.), ♀, Mains of Cairnbrock NW9765, Wigtownshire (VC 74) 25.vii.2014, leg. "The Grey Daggers" – local lepidopterists' group, new species to Scotland; *Blastobasis* sp., possibly *B. vittata* (Wollaston), 2 of 8 seen flying around the summit cairn on Arthur's Seat, Edinburgh, NT2772, Midlothian (Edinburgh) (VC 83) 13.vii.2014, leg. K. P. Bland.

CLANCY, S. P. – *Gravitarmata margarotana* (Heinemann), Kingsdown, TQ9359 approx, E.Kent (VC 15), 5.v.2014, leg. Nigel Jarman, fourth British and second Kent record; *Eana penziana* (Thunberg) f. *bellana* (Curtis), two specimens, Whitbarrow Scar, SD4487, Cumbria (VC 69), 27.vii.2013; *Aphomia zelleri* (Joannis), Dungeness, TR0917 approx., E. Kent (VC 15), 25.vii.2013, aberrant form, with the usual twin discal spots replaced with a white longitudinal streak; *Pediasia fascelinella* (Hübn.), Dungeness, TR0917 approx., E. Kent (VC 15), 22.vii.2014, pale immigrant example; *Hellula undalis* (F.), Old World Webworm, Dungeness, TR0917 approx., E. Kent (VC 15), 18.x.2014, third area record; *Spoladea recurvalis* (F.), Dungeness, TR0917 approx., E. Kent (VC 15), 16.x.2014, second area record; *Paracorsia repandalis* (D. & S.), Kingsdown, TQ9359 approx., E. Kent (VC 15), 1.ix.2014, leg. Nigel Jarman, fifth British record, new to Kent; *Etiella zinckenella* (Treitschke), Kingsdown, TQ9359 approx., E. Kent (VC 15), 29.vii.2013, leg. Nigel Jarman, 13th British record, new to Kent; *Calamotropha paludella* (Hübn.), Lydd-on-Sea, TR0420, E. Kent (VC 15), an example exhibiting terminal banding; *Anerastia lotella* (Hübn.), Dungeness, TR0917 approx., E. Kent (VC 15), 19.vii.2013, exaggerated longitudinal variegation.

COOK, R. R. – *Musotima nitidalis* (Walker), Hurn Forest, SZ1199 approx., Dorset (VC 9), bred specimens from larvae found feeding on the underside of bracken, *Pteridium aquilinum* (L.) Kuhn leaves 10.vi., 15.vi., 22.vi. & 28.x.2014; *Sciota adelphella* (Fischer von Röslerstamm), two specimens, Greatstone, TR0822, E. Kent (VC 15) 15 & 16.vii.2014, at MV; *Dioryctria sylvestrella* (Ratzeburg), Ferndown SU0700 approx, Dorset (VC 9), 6.viii.2014, MV in a garden with much Scots Pine, *Pinus sylvestris* L..

DAWSON, J. R. – *Prays peregrina* (Agassiz), Cambridge TL4660, Cambridgeshire (VC 29) to MV light, 1.v.2014, leg. R. Law, new VC record; *Agdistis bennetii* (Curtis), Fulbourn TL5153, Cambridgeshire (VC 29) to MV light 20.viii.2012, leg. J. R. Dawson, new VC record; *Cydalima perspectalis* (Walker) Witcham TL4680, 7.x.2010 Cambridgeshire (VC 29), to MV light, leg. D. Hopkins, new VC record.

DE PRINS, J. – *Choreutis nemorana* (Hübn.), Hyde Park, TQ2780, London, Middlesex (VC 21), moths bred from fig, *Ficus carica* (L.) in July 2014 (Plate 8, Fig 4). **New to Britain.** It is a Mediterranean species, which can occasionally be a minor pest. For larval habits with photographs see *Ent.Rec.* 2014, **126**: 157–163.

ELLIOTT, B. – *Tinea flavescentella* Haworth, cases and imagines, Romsey, SU3521 approx., S. Hampshire (VC 11) 15.iv.2014, the chance observation of a tineid in assembling mode on a box of bone meal in a garden centre led to the discovery of an abundant infestation (picture provided), the first record for Hampshire since K. G. Blair's in 1974; *T. pellionella* L., Chandler's Ford, SU4320 approx., S. Hampshire (VC 11), cases and imagines for comparison; *Acleris hyemana* (Haworth), Chandler's Ford, SU4320 approx., S.Hampshire (VC 11), 23.x.2014, to MV, a melanic form, with typical example for comparison; *Epinotia cinereana* (Haworth), Dorset (Watsonian S. Hampshire (VC 11)), larvae on aspen, *Populus tremula* L., 15.vi.2014, now a valid species, distinguished from *E. nisella* (Clerck), see *Zootaxa* **3318**: 1–25 (2012); *Agonopterix atomella* (D. & S.), S. Hampshire (VC 11), 28.v.2014, larvae on Dyer's Greenweed, *Genista tinctoria* L., the species seems to have declined, and these may be the first Hampshire records since the 1980s.

HALL, N. M. – Selected Microlepidoptera. *Paratalanta pandalis* (Hübn.) Bordered Pearl, Porton Down, Hants (VC 12), 1.vi.2014; a melanic form of *Endotricha*

flammealis (D. & S.), Thatcham, SU5036674, Berks (VC 22), 18.vii.2014 (Plate 8, Fig. 5); a *Udea* sp., Hulse Road, Salisbury, 28.vii.2014, Wilts. VC 8. Originally thought to be *fulvalis* (Hübn.) but the features of the aedeagus do not match the figures in 'Molecular and morphological phylogeny of European *Udea* moths (Insecta: Lepidoptera: Pyraloidea)' by Richard Mally & Matthias Nuss, available in pdf form on the web. *Tachystola acroxantha* Meyrick, Earley, Reading Berks (VC 22), singletons seen from 23.x.2014 to 31.x.2014.

KNILL-JONES, S. – Moths from the exhibitor's garden at Totland SZ3286, Isle of Wight (VC 10), including *Sclerocona acutellus* (Everesmann), 14.vi.2014, *Diasemiopsis ramburialis* (Duponchel), 9.vi., 28.x. & 30.x.2014, *Evergestis extimalis* (Scopoli), 17.ix.2014, *Digitivalva pulicariae* Klimesch, 3.iv.2014.

LANGMAID, J. R. – *Metalampra italica* (Badizzone), Southsea, SZ6598, S. Hampshire (VC 11) 12.vii.2014, third county record; *Bryotropha basaltinella* (Zeller), Southsea, SZ6598, S. Hampshire (VC 11) 12.vii.2014, second county record; *Coleophora deviella* Zeller, Bawdsey Quay, TM3337, Suffolk (VC 25), case found 3.ix.2013, moth emerged 6.vii.2014, new to Suffolk; *Blastobasis vittata* (Wollaston), Southsea, SZ6598, S.Hampshire (VC 11) vii–viii.2014, four specimens showing how similar they are to *B. adustella* Walsingham; *B. maroccanella* Amsel, two specimens, Southsea, SZ6598, S. Hampshire (VC 11), 25.vii. & 11.xi.2013, undistinguished-looking and difficult to tell from dark specimens of *B. adustella*, **new to Britain** (Plate 8, Fig 2); *Acleris effractana* (Hübn.), two, Acarsaid, Eriskay, NM5872, West Inverness-shire (VC 97), June 2014, bred from *Salix repens* L.; *Ephestia unicolorella* Staudinger, Southsea, SZ6598, S.Hampshire (VC 11), 11.vi.2014, an aberrant specimen.

LANGMAID, J. R. and PLANT, C. W. – *Tetramoera langmaidi* Plant, 2014, ♂, the holotype Southsea, SZ6598, S. Hampshire (VC 11), 28.vii.2008, leg. J. R. Langmaid, ♀, a paratype, Hertford, TL3212 approx., Hertfordshire (VC 20) 24.vii.2014, leg. Andrew Wood (Plate 8, Fig 1). Along with this spectacular moth were photographs of the ♂ and ♀ genitalia. See *Ent.Rec.* **126**: 164–174. A further three specimens were caught by Andrew Wood in Hertford but were not retained. **New to Britain.**

MANNING, D. V. – an atypical form of *Agriphila geniculea* (Haworth), Bromham TL0051, Bedfordshire (VC 30), 15.viii.2014, leg. M. Harrison, det. D. V. Manning.

MCCORMICK, R. F. – *Olethreutes arcuella* (Clerck), Yarner Wood, Dartmoor, SX7778, S. Devon (VC 3), 3.vi.2014, at light; *Anania hortulata* (L.), Teignmouth SX9473, S. Devon (VC 3), 10.vii.2014, dark aberration (Plate 8, Fig 9); *Mecyna flavalis* Caradja, Axminster SY2998, S. Devon (VC 3), 18.vii.2014, new to Devon.

MASTERS, I. – New site records for Middleton-on-Sea, SU982004, West Sussex (VC 13), all at MV light-trap. *Phtheochroa inopiana* (Haworth), 16.vii.2013, *Spilonota ocellana* (D. & S.) 20.vii.2013, *Gymnancyla canella* (D. & S.), 24.vii.2013 and *Platytes alpinella* (Hübn.) 18.vii.2014 – a second specimen was recorded on 22.vii.2014.

OWEN, J. – Less usual (but regular) species from the garden at Eastbridge House near Dymchurch, TR076319, E. Kent (VC 19) at MV lamp: *Psammotis pulveralis* (Hübn.), 18.vii.2014, *Catoptria verellus* (Zincken), 24.vi.2014, *Antigastra catalaunalis* (Duponchel), 19.ix.2014, *Loxostege sticticalis* (L.), 26.vii.2014.

PALMER, S. & C. – Gelechiid Recording Scheme *www.gelechiid.co.uk*. A small series of provisional distribution maps and other information relating to the Scheme. The maps, produced using MapMate, covered seven better-known species and one showing the geographical spread of all records contributed to the Scheme.

PIRES, P. – *Clepsis dumicolana* (Zeller), Royal Brompton Hospital, Chelsea, TQ2778, Middlesex (VC 21), 15.v.2014, on an east wall on ivy, *Hedera helix* L., at midday, also specimens from June-October, **new to Britain.**

SIMS, I. – *Acleris literana* (L.), Beale Park, Pangbourne, SY6376, Berkshire (VC 22), 6.iv.2014

TERRY, R. – *Glyphipterix equitella* (Scopoli), Box Hill, TQ1951 approx, Surrey (VC 17), 7.vi.2013 leg. A. Culshaw, listed as extinct in *Smaller Moths of Surrey*; *Amphisbatis incongruella* (Stainton), Thursley Common SU9040 approx., Surrey (VC 17), 25.iii.2012, leg. David Howdon, new Surrey site for species; *Gelechia muscosella* Zeller, Old Stores Meadows, Capel TQ1740 approx., Surrey (VC 17) 28.6.2007, leg. D. Fraser, possibly new to Surrey; *Coleophora orbitella* Zeller, Old Stores Meadows, Capel TQ1740 approx., Surrey (VC 17), 2.vi.2009, leg. D. Fraser, new Surrey site; *Coleophora currucipennella* Zeller, Box Hill, TQ1951 approx., Surrey (VC 17), 21.vi.2014, leg. D. Howdon, second recent county record and new site; *Coleophora tamesis* Waters, Old Stores Meadows, Capel TQ1740 approx., Surrey (VC 17), 3.vii.2014, leg. D. Fraser (new Surrey site); *Coleophora clypeiferella* Hofmann, Old Stores Meadows, Capel TQ1740 approx., Surrey (VC 17), 18.viii.2012, leg. D. Fraser, new recent Surrey record; *Elachista bedellella* (Sircom), Box Hill, TQ1951 approx., Surrey (VC 17), 9.viii.2013, leg. D. Howdon, listed as extinct in *Smaller Moths of Surrey*; *Elachista cinereopunctella* (Haworth, 1828), Box Hill, TQ1951 approx., Surrey (VC 17), 23.v.2014, leg. D. Howdon, new recent Surrey record; *Phalonidia manniana* (Fischer von Röslerstamm) *sensu stricto*, Old Stores Meadows, Capel TQ1740 approx., Surrey (VC 17), 30.vi.2006 & 16.vii.2007, leg. D. Fraser, recently revised species; *Phalonidia udana* (Guenée), Old Stores Meadows, Capel TQ1740 approx., Surrey (VC 17), 28.vi.2007, leg. D. Fraser, recently recognised British species; *Stigmella malella* (Stainton), Woodville Road, Barnet, TQ2495 approx., 27.viii.2014, Middlesex (VC 21), leg. & det. R.Terry, new county record; *Monochroa suffusella* (Douglas), Fir and Pond Woods, Potters Bar, TL2601 approx., Middlesex (VC 21), 4.viii.2014, leg. & det. R. Terry, new county record; *Coleophora conspicuella* Zeller, Fir and Pond Woods, Potters Bar, TL2601 approx., Middlesex (VC 21), 12.vi.2012 (case); *C. conspicuella* Zeller, Woodville Road, Barnet, TQ2495 approx, Middlesex (VC 21), 2.vii.2014, leg. & det. R. Terry, first recorded in Middlesex by D. J. L. Agassiz at Enfield Highway on 28.vii.1978, no other adult records until now; *Commophila aeneana* (Hübn.), Paradise Fields, Greenwood, TQ1382 approx., Middlesex (VC 21), 8.v.2011, leg. A. Culshaw, previously listed for county without provenance; *Hedya nubiferana* (Haworth), Woodville Road, Barnet, TQ2495 approx, Middlesex (VC 21), 2.vi.2014, leg. & det. R. Terry, unusual melanic example.

THIRLWELL, I. R. – *Lyonetia prunifoliella* (Hübn.), Portsmouth, SU6700, S. Hampshire (VC 11), 7.viii.2014, new to county (Plate 8, Fig 3); *Bedellia somnulentella* Stainton, Portsmouth, SU6700, S. Hampshire (VC 11) 18.vii.2014, an unusual plain, unmarked form; *Blastobasis vittata* (Wollaston), Portsmouth, SU6700, S. Hampshire, several specimens taken in 2014 showing the variability of the species; *Acleris umbrana* (Hübn.), Portsmouth, SU6700, S. Hampshire (VC 11) 14.vii.2014, the second record in Hampshire since the 1930s, apart from a specimen taken at Pennington as part of an unusual migration event. Previously known from the New Forest but always scarce and elusive.

FOREIGN LEPIDOPTERA

GEORGE, A. M. – Mountain Fritillary *Boloria napaea* (Hoffmannsegg) showing a minor underside aberration. Collected at First, above Grindelwald, in the Bernese Oberland of Switzerland, 30.vi.2014. This was the only individual that was recorded in this late season.

GILL, N. – (1) *Pseudocoremia suavis* Butler, a species endemic to New Zealand, apparently established in West Cornwall. (2) Specimens of *Xestia alpicola alpina* (H.&W.), ex pupae from Lecht, Aberdeenshire.

HALL, N. – (1) *Thysanoplusia orichalcea (*F.) (Slender Burnished Brass), bred from a female taken at light at Corralejo, Fuerteventura on 5.iv.2014. The captured female was put it in a 1″ (2.5 cm) diameter tube and started laying eggs immediately. The eggs had hatched by the morning of 10th April and fed up rapidly on Asteraceae. The first larva to spin had done so by 22nd April and all had done so by 26th April. The first four adult moths had emerged by 2nd May, only 26 days after the eggs were laid and five more had emerged by 4th May. Only one emerged after that – on 28th May. Having taken its time it seemed a bit bigger than the rest! (2) "A brush with Glottulini". Examples of *Polytela cliens* (Felder & Rogenhofer) from Fuerteventura and *Brithys crini* (F.), Kew Arches from France. Two examples of *Polytela cliens* during a holiday in Costa Calma, Fuerteventura, were indentified by Martin Honey. The species is thought to be a recent arrival in the Canaries and is also present in the Balearics. The mainly banded larvae are bulb feeders. Images on the Internet, depict larvae feeding on Brown Bluebell (*Dipcadi serotina*, Asparagaceae) in Fuerteventura near Costa Calma, where the exhibitor had been staying and the article also said that elsewhere it had been reported feeding on *Pancratium tortuosum*. The larvae were transversely banded, alternating black bands with white or yellow ones. These were reminiscent of banded *Brithys crini* (Kew Arches) larvae feeding on or within the leaves of Sea Daffodil *Pancratium maritimum* in both France and Spain. It is not surprising then to find that *crini* and *cliens* are related within the Glottulini.

HARMER, A. S. – (1) A short series of Adonis Blue *Lysandra bellargus* (Rott.) bred from a female form *ceronus* Esper, captured in the Hautes-Alpes, France in June 2014 at 1334 metres. The intention was to investigate the genetics and any seasonal factors associated with this aberration. However, the F_1 generation of 104 individuals consisted entirely of females. None of them displayed the amount of blue of the P_1 female; any blue scaling was mainly confined to wedges above the orange, submarginal lunules to the hindwings. Underside variation was minimal; two specimens had reduced spotting on the underside. Instances of single sex broods have been observed in broods of the Small Copper *Lycaena phlaeas* (L.) by the exhibitor and other breeders, but nothing to this extent. The phenomenon of all female broods has long been known in the nymphalids *Acraea encedon* (L.) (Africa) and *Hypolimnas bolina* (L.) (Fijis). It is inherited entirely through the female line and the presence of a male killing *Wolbachia* bacterium has been cited as a causal factor; unfortunately, on-line research did not produce any comparative studies in European butterflies. In the instance of *bellargus*, the ova laid by the P_1 female were not counted or examined for mortality. However, given that she was not fresh when caught (undoubtedly having already commenced laying), combined with the very low level of mortality observed in the subsequent stages and the number of progeny that resulted, it would suggest some other explanation in this instance. The emergence of a gynandromorph (or possibly dimorphic) female (Plate 7, Fig 3) from young larvae given to Richard Revels to breed, may be of some relevance. (2) A short series of Turquoise Blue *Polyommatus dorylas* (D. & S.), demonstrating the range of underside spotting in a small summer brood, including one almost obsolete specimen.

PICKLES, A. J. – (1) Common European geometrid species of the subfamily Ennominae. *Itame vincularia* (Hübn.), France; *Perigune convergata* (Villers), France ; *Perigune narbonea* (L.), France ; *Pachycnemia hippocastanaria* (Hübn.). (2) Contrasting specimens of *Crocallis tusciaria* (Borkhausen) from Southern England,

Rhodes and the South of France. (3) Contrasting dark specimens of *Menophra nycthemeraria* (Geyer) from the Alpes-Maritimes with lighter specimens from further north and west in the Lot. (4) Comparison of five species of the mountain genus *Elophos* from the Western and Swiss Alps – *Elophos zelleraria* (Freyer); *Elophos unicoloraria* (Staudinger); *Elophos caelibaria* (Heydenreich); *Elophos operaria* (Hübn.) and *Elophos andereggaria* (La Harpe) alongside *Odontognophos sartata* (Treitschke) from Rhodes, congeneric with our well known *O. dumetata* (Treitschke) and *Gnophos furvata* (D. & S.) – a large "annulet" from the French Alps.

TREMEWAN, W. G. – An example of a male *Colias croceus* (Geoffroy) with an aberrant underside: the discoidal black spot of each forewing is extended as a streak towards the termen, the hindwings are suffused with black scaling in the discal area of each wing. Captured 12.vi.2014, Greece, Epirus, Ioannina Ag., Paraskevi road, ca 5 km S. of bridge, 600 m.

DIPTERA

CHANDLER, P. J. – (1) *Greenomyia mongolica* Laštovka & Matile (Mycetophilidae) – now a common garden insect. Specimens caught in 2014 were exhibited: Fleet Pond (SU8255), Hants, ♂ swept from heather, 9.ix; Morning Springs Wood (SK495492), Notts, ♂ and ♀ at ivy flowers, 16.x. The exhibitor's only previous experience of this species was when it was numerous on Hogweed *Heracleum sphondylium* flowers in rides of a conifer plantation at Stock Hill Forest, Somerset on 25.vii.2010. This very distinctive gnat was first found in Britain in 2006 by Graham Collins and is evidently a recent arrival in Britain; first described from Mongolia, it has spread across most of Europe in recent decades. It was known from seven hectads in England when a map was published in Fungus Gnat Recording Scheme Newsletter 4 (Spring 2010). It has since been recorded from at least a further 14 hectads, with the most northerly record in Lincolnshire and at least six records are from houses or gardens. Decayed wood, and compost containing fungal mycelium are probably the main development sites. Adults are often recorded as flower visitors and a wide range of flowers appears to be visited. The wide scatter of records and occurrence in several entomologists' gardens suggest that it may be found in similar situations anywhere in S. England.

(2) *Mycetophila stylatiformis* Landrock (Mycetophilidae), new to Britain from Highstanding Hill Woods, Windsor Forest (SU97), Berkshire, found there on five occasions (25.vi to 23.x.2014: 11 ♂, 11 probable ♀); it is very close to *M. stylata* (Dziedzicki), with similar wing markings and the gonostylus in both species has the ventral lobe bearing three large thickened setae, differing in the form of the dorsal lobe which is more slender and tapered apically in *M. stylatiformis*. Photographs of the wing of *M. stylata* and of the male genitalia of both species were exhibited.

A distribution map for *M. stylata* was also shown; it has a mainly northern and western distribution and is common in Scotland, but there is a scatter of records in the south-east; it has not been recorded at Windsor, but there is a record of it from the nearby Burnham Beeches (SU98); it is possible that these species have been confused and it will be necessary to check previous records of *M. stylata* to ascertain if that is the case.

Regular visits had been made during 2014 to the Highstanding Hill area of Windsor Forest, at about two weekly intervals (thirteen visits from 16.iv to 23.x), concentrating attention on the vicinity of the stream, where fungus gnats were numerous on most visits. A report on the findings has been provided in Fungus Gnat Recording Scheme Newsletter 4 (to be included with the Spring 2015 *Dipterists Bulletin*).

(3) *Drosophila suzukii* (Matsumura) (Drosophilidae), found by the exhibitor at all three sites he regularly visited in 2014: Bushy Park, Middlesex; Windsor Forest, Berks and Fleet Pond, Hants. These records and others from nine counties in S. England have, since the Exhibition, been published in *Dipterists Digest*. This species was first recorded in Britain in 2012 at East Malling in Kent (Harris, A. & Shaw, B. 2014. *Dipterists Digest* **21**: 189–192). The photographs of both sexes from that paper were also shown. It is a cosmopolitan pest of soft fruit, first described from Japan but now widespread in N. America and Europe, and anticipated to be a serious pest of fruit farms. It was apparently unnoticed by dipterists in Britain before 2014, so appears to have expanded its range rapidly, and is now widespread in the south. At most sites association with wild blackberries or elderberries seems likely, but it has twice been reported as visiting decaying honey fungus (*Armillaria*) (see notes in *Dipterists Digest* **21**: 192–193), a previously unrecorded association.

DICKSON, R. J. – Some Diptera found in South Hampshire (VC 11) in 2014: *Tipula peliostigma* (Schummel) (Tipulidae) ♂, Fairthorne Manor YMCA (SU523126) near Botley, 18.vi.2014, by sweeping; *Beris fuscipes* Meig. (Stratiomyidae), ♂ and ♀, Fairthorne Manor YMCA (SU523126) nr Botley, 18.vi.2014, *in copula* on alder *Alnus glutinosa* leaf by small stream; *Villa cingulata* (Meig.) (Bombyliidae), three from Old Winchester Hill NNR (SU6420), 14.vii.2014, leg. K. J. Wheeler; *Doros profuges* (Harris) (Syrphidae), Old Winchester Hill NNR (SU6420), near West Meon, 9.vi.2014, on sunlit bramble *Rubus fruticosus* foliage, leg. K. J. Wheeler.

HALSTEAD, A. J. – Some uncommon or local Diptera found in 2014: *Machimus rusticus* (Meig.) (Asilidae) ♂, *Leptarthrus vitripennis* (Meig.) (Asilidae) ♂ and *Oxyna flavipennis* Loew (Tephritidae) ♂, swept, 22.vi.2014, Newlands Corner (TQ043490), Surrey; *Cnodacophora stylifera* (Loew) (Micropezidae) ♂, *Microprosopa pallidicauda* (Zett.) (Scathophagidae) ♀ and *Cordilura picticornis* (Loew) (Scathophagidae) ♂, swept, 2.vi.2014, Kinrara Marsh (NH882098), Easterness; *Acanthiophilus helianthi* (Rossi) (Tephritidae) ♀, *Cheilosia latifrons* (Zett.) (Syrphidae) ♂ and *Stomorhina lunata* (F.) (Rhiniidae) ♀, swept, 30.viii.2014, River Mole at Gatwick (TQ2441), VC Surrey; *Tachytrechus insignis* (Stannius) (Dolichopodidae) ♂ and *Acinia corniculata* (Zett.) (Tephritidae) ♂, swept, 24.viii.2014, Heather Farm, Mimbridge (SU994607), Surrey; *Platycheirus rosarum* (F.) (Syrphidae), abnormal form of ♂ with yellow spot missing on left side of abdomen, swept, 8.vii.2014, Llyn Geirionydd (SH761603), Caerns; *Trichopsomyia flavitarsis* (Meig.) (Syrphidae), abnormal form of ♀, lacking the yellow spots usually seen on the abdomen of females, swept, 11.vii.2014, Llyn-y-Gader (SH567524), Caerns; *Myopa pellucida* (Robineau-Desvoidy) (Conopidae) ♀, on a tulip flower, 10.iv.2014, Highgrove Garden (ST877915), near Tetbury, Glos; *Diplonevra florescens* (Turton) (Phoridae) ♀ and *Norellisoma opacum* (Loew) (Scathophagidae) ♂, swept, 4.vi.2014, Insh Marshes (NH803030), near Kincraig, Easterness; *Ceratitis capitata* (Wied.) (Tephritidae) ♂ and ♀, from a nectarine fruit, emerged 21.viii.2014 in the exhibitor's house (SU964588), Knaphill, Surrey; *Terellia winthemi* (Meig.) (Tephritidae), ♀ swept 25.vi.2014, Papercourt Marsh (TQ034562), near Send, Surrey; *Eccoptomera obscura* (Meig.) (Heleomyzidae), ♂ swept, 15.x.2014, Foxcovert Plantation, near Hucknall (SK589507), Notts; *Scathophaga scybalaria* (L.) (Scathophagidae), ♂ and ♀ swept, 10.vii.2014, Cors Bodeilio (SH503774), Anglesey.

HARVEY, M. C. – Updates from the Soldierflies and Allies Recording Scheme. A copy of the latest newsletter, and information on submitting records to the scheme, were displayed. Attention was drawn to two recent guides in Dutch (respectively covering Stratiomyidae and Xylomyidae, and Bombyliidae and Mythicomyiidae), on

which further details were available on the recording scheme website (*www.brc.ac.uk/soldierflies-and-allies/home*).

PERRY, I. – A selection of uncommon Diptera found during 2014: *Prionocera pubescens* Loew (Tipulidae), Matley Bog (SU331072), New Forest Hants, 5.v, numerous over a very restricted area and distinguished in the field from *P. turcica* (F.), which was widespread at the site, by its slight but consistently smaller size; *Stratiomys longicornis* (Scop.) (Stratiomyidae), Lynford Water (TL826948), Norfolk, 15.v, a surprising discovery of this coastal species, inland at a gravel pit in the Breckland; *Eutolmus rufibarbis* (Meig.) (Asilidae), Lode (TL531626), Cambs, 17.vii, in recent years this species has spread into South Cambs from its Breckland headquarters, but the exhibitor was surprised to find several in his garden in 2014; *Hilara setosa* Collin (Empididae), Glen Lochay (NN538354), Perthshire, 11.ix, swept from trees overhanging exposed river shingle; *Mallota cimbiciformis* (Fall.) (Syrphidae), Lode (TL531626), Cambs, 6.vii, a welcome visitor to Fennel *Foeniculum vulgare* Mill. flowers in the exhibitor's garden – it had last been seen at Lode in 1966; *Myopa fasciata* Meig. (Conopidae), Sutton Common (TM334472), Suffolk, 31.viii, at flowers of Ling *Calluna vulgaris* (L.), seemingly restricted now to the Suffolk Sandlings in East Anglia; *Palloptera ambusta* (Meig.) (Pallopteridae), Warburg NR (SU715879), Oxfordshire, 26.vii, swept from damp woodland; *Clusia tigrina* (Fall.) (Clusiidae), Warburg NR (SU715879), Oxfordshire, 3.viii, swept from Beech logs; *Huebneria affinis* (Fall.) (Tachinidae), Lode (TL531626), Cambs, 21.vii, at flowers of *Bupleurum fruticosum* L. in the exhibitor's garden and at The Naze (TM265246), Essex, 7.viii, on flowers of Wild Parsnip *Pastinaca sativa* L.; *Thelyconychia solivaga* (Rond.) (Tachinidae), Dingle Marshes (TM480714), Suffolk, 1.vii, swept from edge of shingle beach, the most northerly record to date; *Townsendiellomyia nidicola* (Townsend) (Tachinidae), Orford Ness (TM434488), Suffolk, 16.vii, and The Naze (TM263247), Essex, 16.viii, on brambles at both sites, appears to be spreading like its host the Brown-tail Moth *Euproctis chrysorrhoea* (L.); *Winthemia cruentata* (Rond.) (Tachinidae), Lynford Water (TL826948), Norfolk, 29.vii, attracted to honeydew on sallows.

COLEOPTERA

BANTOCK, T. – *Stenus* (*Tesnus*) *intermedius* Rey (Staphylinidae), Chepstow, Monmouthshire (VC 35), ST5393, in suction-samples from stands of Common Couchgrass *Elymus repens* and Sea Couchgrass *Elymus pycnanthus* along the upper saltmarsh zone of the River Wye, a few males found on several dates in 2013 and 2014. **The first records for Britain**.

BOOTH, R. G. – A few recent captures. *Stenolophus teutonus* (Schrank) (Carabidae), Thompson Village Hall, West Norfolk, TL920965, one female crawling over short grass, 6.vii.2014, this species has spread since Luff's 1998 Carabidae Atlas. *Tachyporus formosus* Matthews (Staphylinidae), Ot Moor, Oxfordshire, SP569129, one female sieved from grass tussock, 13.ii.2014. *Quedius lucidulus* Erichson (Staphylinidae), Laleham, Middlesex, TQ0669, one male sieved from *Laetiporus* sporophore in small wood, 10.vii.2010, this early record is only a couple of months or so later than Mark Telfer's original find new to Britain (*The Coleopterist* **21**: 129–131), but the specimen was misidentified originally as *Q. scintillans* (Gravenhorst) to which it is very similar and easily confused; the two species can be separated externally by the microsculpture on the head which is much finer and closer in *Q. lucidulus* when viewed at a magnification of about 70×. The species was found again at Osterley Park, Middlesex, TQ144782, sieving a pile of

grass cuttings, 17.iii.2014. *Meligethes subrugosus* (Gyllenhal) (Nitidulidae), St. Bees Head, Cumberland, NX944135, on flower heads of *Jasione montana* along path, 29.vii.2013, at the northern limit of its UK range. *Atomaria zetterstedti* (Zetterstedt) (Cryptophagidae), Thompson Common, West Norfolk, TL9396, one female by sweeping edge of shaded pond, 6.vii.2014, a new vice-county record for this species which has spread in recent years. *Scymnus schmidti* Fürsch (Coccinellidae), Grune Point, Cumberland, NY141569, one male by sweeping coastal grassland, 27.vii.2013, apparently a new record for Cumberland. *Scymnus interruptus* (Goeze) (Coccinellidae), Faversham, East Kent, TR018621, beating ivy growing over wall, 11.viii.2013, this species continues to spread in southern England. *Nephus quadrimaculatus* (Herbst) (Coccinellidae), Faversham, East Kent, TR018621, beating ivy growing over wall, 11.viii.2013, this appears to be a new vice-county record. *Longitarsus reichei* Allard (Chrysomelidae), Anthorn, Cumberland, NY196582, one female by sweeping a narrow strip of salt marsh between road and estuary, 31.vii.2013, near the northern limit of its UK range. *Catapion pubescens* (Kirby) (Apionidae), Grune Point, Cumberland, NY141569, one male by sweeping coastal grassland, 27.vii.2013, at the northern limit of its UK range. *Ceratapion carduorum* (Kirby) (Apionidae), Grune Point, Cumberland, NY141569, one female by sweeping coastal grassland, 27.vii.2013, this appears to be well to the north of any other British record.

BROTHERIDGE, D. – Three longhorns (Cerambycidae) from Wiltshire. *Obrium brunneum* (F.), Stanton Park, North Swindon, VC 7, SU176901, 2.vi.2009, indicating an expansion of the range of this species. *Poecilium alni* (L.) lacking white markings, Green Lane Wood, Wiltshire Wildlife Trust Reserve near Trowbridge, VC 8, ST886557, 5.v.2011. *Tetropium fuscum* (F.), fourth British record, Bentley Wood WWT Reserve, VC 8, SU252299, 30.vi.2013 confirmed by M. Darby.

COLLIER, M. J. & LANE, S. A. – Some recent records from Norfolk. *Carabus arvensis* Herbst (Carabidae), East Winch Common NR, VC 28, TF7015, 2.iv.2014, common in pitfall traps in March and April 2014 (SAL); also common in the same period at Shouldham Warren, VC 28, TF6810, (SAL), the first modern records for Norfolk. *Dyschirius angustatus* (Ahrens) (Carabidae), Brandon, VC 28, TL7887, 10–23.v.2014, one example in pitfall trap (SAL), the first record for Norfolk and East Anglia. *Panagaeus cruxmajor* (L.) (Carabidae), Holme Dunes NR, VC 28, TF7144, 1.ix.2014, one example in reed litter pile in dune slacks (SAL), the first modern Norfolk record. *Oxytelus piceus* (L.) (Staphylinidae), East Winch, VC 28, TF6916, 5.ix.2014, in garden moth trap (black light) (SAL), the second Norfolk record. *Gabrius keysianus* Sharp (Staphylinidae), East Wretham Heath NR, VC 28, TL9088, 5.viii.2014, common under algal mats on drawdown zone of shallow sandy-bottomed mere (SAL), the first record for Norfolk and East Anglia, this species usually occurs at coastal sites in Britain. *Quedius fulgidus* (F.) (Staphylinidae), Holme Dune NR, VC 28, TF7144, 14.vii.2014, in moth trap (SAL), the first modern Norfolk record. *Eucinetus meridionalis* (Laporte) (Eucinetidae), Cockleycley Wood, TF7705, VC 28, 2.x.2013, one example in heap of fungoid coniferous bark debris (MJC), the first Norfolk record. *Procraerus tibialis* (Lacordaire) (Elateridae), Oxburgh Hall, VC 28, TF7400, 7–27.vi.2013, two in aerial vane trap in veteran oak tree (MJC), the first Norfolk record. *Elater ferrugineus* L. (Elateridae), Stanford Training Area, VC 28, TL8392 and TL8496, 5.viii.2013, one of three males flying to a pheromone lure (MJC); also recorded from two further sites in VC 28 in the same month (MJC), the first Norfolk records. *Meligethes haemorrhoidalis* Förster (Nitidulidae), Methwold Severals, VC 28, TL6697, 2.iv.2014, (SAL); also recorded at Barton Bendish, VC 28, TF7306, on the same date (SAL), the first Norfolk records. *Atomaria punctithorax*

Reitter (Cryptophagidae), Hillington Road NR, VC 28, TF7325, 28.iii.2014, in moss on chalky roadside embankment (SAL); also recorded near Derby Fen, VC 28, TF7021, 18.ix.2013, in old hay heap (SAL), Lodge Farm, Swaffham Heath, VC 28, TF7707, 1.xi.2013, in hay bales (SAL) and Holme Dunes NR, VC 28, TF7144, 15.ix.2014, in litter heap near grazing marsh (SAL); these are the first Norfolk records. *Myrmechixenus vaporariorum* Guérin-Méneville (Tenebrionidae), Oxburgh Hall, VC 28, TF7401, 2.x.2013, in heap of mouldy grass cuttings (MJC), the first Norfolk record. *Gymnetron rostellum* (Herbst) (Curculionidae), Brandon, VC 28, TL7887, 1–10.v.2014, in pitfall trap in short turf (SAL), the second modern Norfolk record. *Rhinusa collina* (Gyllenhal) (Curculionidae), Cranwich Heath, VC 28, TL7893, 27.vi–11.vii.2013, two examples in pitfall traps in sandy Forestry Commission ride containing toadflax *Linaria vulgaris* (MJC), the first Norfolk record. *Calosirus terminatus* (Herbst) (Curculionidae), East Winch sand pits, VC 28, TF6917, by grubbing in short turf, 16.iii.2014 (SAL), the first modern Norfolk record. *Datonychus urticae* (Boheman) (Curculionidae), Cockleycley Wood, VC 28, TF7705, 17–29.iv.2014, in pitfall traps in Forestry Commission ride with Hedge Woundwort (SAL), the first Norfolk record; also found in small numbers at this site by SAL, MJC and other recorders by sweeping and grubbing below foodplant from April to August 2014; unfortunately the site has now been badly damaged by forestry activities. *Glocianus pilosellus* (Gyllenhal) (Curculionidae), Cranwich Heath, VC 28, TL7893, 19.vi.2013, one example by sweeping in sandy Forestry Commission ride (MJC); also found at Cranwich Camp, VC 28, TL7794, 24.ix.2013 (SAL), the first Norfolk records. *Polydrusus formosus* (Mayer) (Curculionidae), Brandon, VC 28, TL7886, 23.v.2014, swept from riverside alders (SAL); also found at the University of East Anglia, Norwich, VC 27, TG1807, 31.v.2014 (SAL), the first Norfolk records. *Romualdius bifoveolatus* (Beck) (Curculionidae), Beeston Regis Caravan Park, VC 27, TG1743, 4–11.vi.2014, several in pitfall traps in rough cliff-top grassland (MJC) and West Runton, VC 27, TG1743, 24.viii.2014, one example crawling on sheet next to garden moth trap (black light) (MJC), the first definite Norfolk records; previous published records for this species almost certainly refer to *R. angustisetulus* (Hansen). *Rhinocyllus conicus* (Frölich) (Curculionidae), Nar Valley Fisheries (Middleton Pits), VC 28, TF6812, 28.viii.2013, found crawling up arm (MJC), the first Norfolk record; subsequently recorded from two other sites in VC 28: Redwell Marsh, TF7043, 30.vi.2014 (A. Brown det. SAL) and King's Lynn, TF6319, 24.vi.2014 (SAL).

DICKSON, R. J. – some notable beetles from South Hampshire (VC 11). *Ellescus bipunctatus* (L.) (Curculionidae), Lee Ground Coppice, Botley Woods nr Whiteley, SU5309, 7.vii.2014, by sweeping under sallow; *Adalia decempunctata* (L.) (Coccinellidae), West Walk nr North Boarhunt, SU6012, 27.vi.2014, MV light and Fareham Moth Group and Titchfield Canal NR, SU5302, 30.vi.2014, by sweeping, virtually identical very plain beige forms; *Hemitrichapion waltoni* (Stephens) (Apionidae), Old Winchester Hill NNR nr West Meon, SU6420, 8.ix.2014, by sweeping; *Tachyerges pseudostigma* (Tempère) (Curculionidae), Lee Ground Coppice, Botley Woods nr Whiteley, SU5309, 7.vii.2014, by sweeping; *Agelastica alni* (L.) (Chrysomelidae), Horton Heath south site, nr Eastleigh, SU4917, 18.vii.2014, pair *in copula* on alder, leg. George Else; *Ophonus laticollis* Mannerheim (Carabidae),West Walk nr North Boarhunt, SU6012, 18.7.2014, at MV light by Fareham Moth Group; *Aleochara kamila* Likovsk (Staphylinidae), Fareham, SU579069, 24.iv.2014, in submerged pitfall trap set alongside compost heap in exhibitor's garden; *Aphodius obliteratus* Sturm (Scarabaeidae), West Walk nr North Boarhunt, SU6012, 29.ix.2014, in horse dung on a sandy forest track; *Trypocopris*

PLATE 5. Fig. 1. View of the Wath upon Dearne brownfield site, South Yorkshire, where *Fieberiella septentrionalis* was collected in 2010. The habitat is characterised by developing willow and birch scrub over areas of low-growing herbaceous and lichen heath vegetation and sparse grassland. Fig. 2. Male specimens of *F. florii* (above) and *F. septentrionalis* (below) collected by T. Bantock. Fig 3. Lateral view of male specimen of *F. septentrionalis* collected from Wath upon Deane, South Yorkshire on 12 August 2010 by J. Flanagan. (Photos: Figs 1 & 3, Jim Flanagan; Fig. 2, Tristan Bantock).

PLATE 6. Fig. 1. Light-green-coloured agamic generation galls of the cynipid *Trigonaspis megaptera* on oak, Blean Woods, Kent, 2013. Photo: Sally Jennings. Fig. 2. Male *Dicyphus tamaninii* from Crystal Palace Park, 23rd August 2013. Fig. 3. *Dicyphus escalerae*. Photo: Rob Ryan, 2014.

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PLATE 7. Fig. 1. *Gonepteryx rhamni* mixed gynandromorph, bred ex larva, 16.vi.2014, A. M. Jones. Fig. 2. *Aglais io* ab. *prochnovi* Pronin induced by sodium tungstate injection, M. A. Yeates. Fig. 3. *Lysandra bellargus* mixed gynandromorph or dimorphic female bred by R. Revels, 27.ix.2014, (ex larva from A. S. Harmer), France, Haute-Alpes, near St-Crépin. Figs. 4 & 5. *Lysandra bellargus*, male and female ab. *discoidalisnulla* Tutt, Purbecks, Dorset, VC 9, 14 & 15.ix.2014, A. S. Harmer. Fig. 6. *Lysandra coridon* ab. *alba* Bright & Leeds, Bedfordshire, August 2013, R. C. Revels. Fig. 7. *Melitaea athalia*, Kent, 1966, leg. H. G. Short, exhibited by K. E. J. Bailey. Fig. 8. *Clossiana selene* cold/heat shock ex North England, June 2014, K. E. J. Bailey. Fig. 9. *Trypocopris vernalis*, Wickham Common, South Hants., 07.vi.2014, leg. K. Coker, exhibited by R. J. Dickson. Fig. 10. *Phryganea grandis*, Titchfield Haven NNR, South Hants., 6.vi.2014, R. J. Dickson.

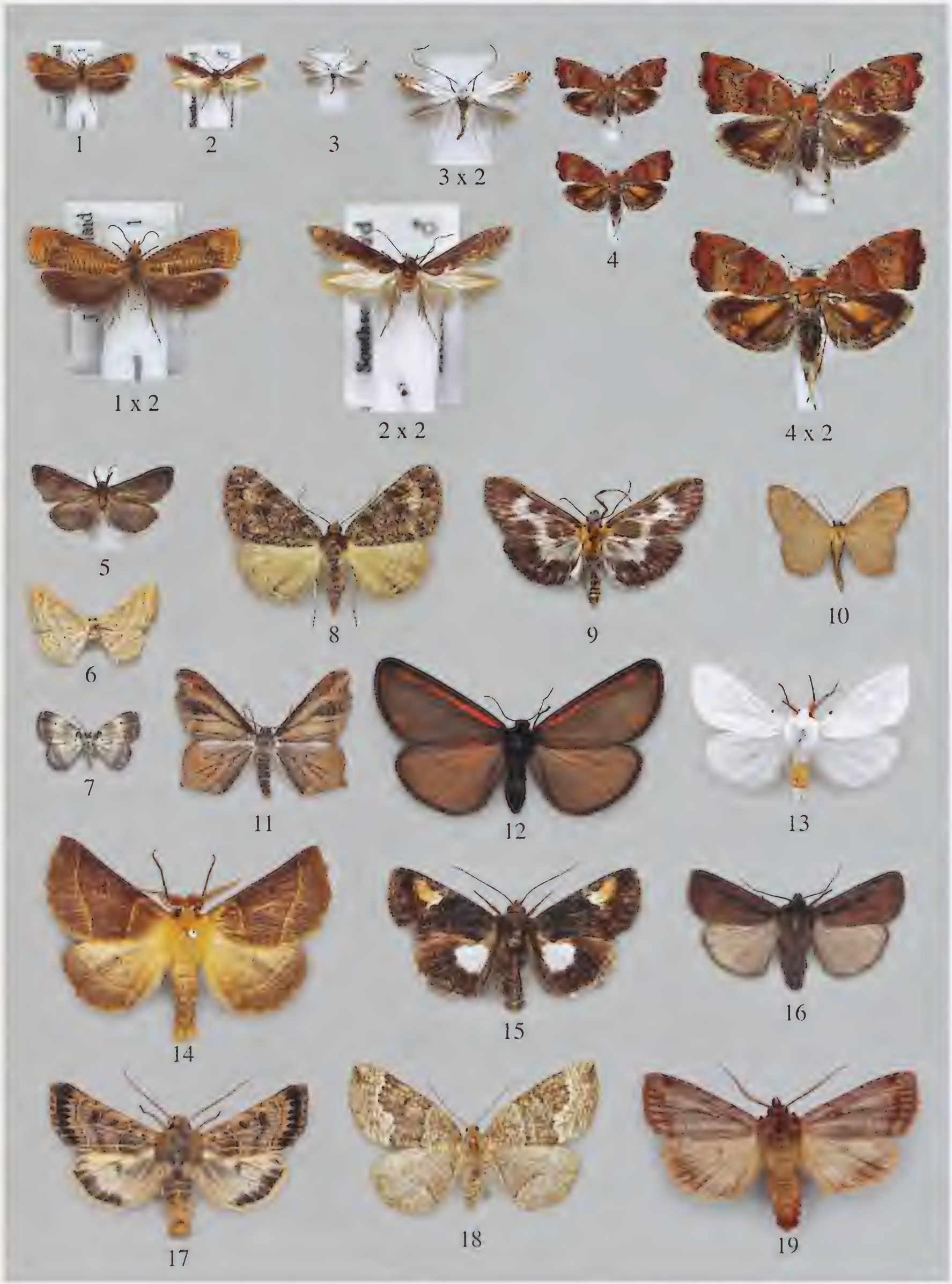


PLATE 8. Fig. 1. *Tetramoera langmaidi* Plant (holotype), Southsea, Hants., 28.vii.2008, leg. J. R. Langmaid, exhibited by C. Plant. Fig. 2. *Blastobasis maroccanella*, (new to Britain), Southsea, Hants., 25.vii.2013, J. R. Langmaid. Fig. 3. *Lyonetia prunifoliella*, Milton Common, Portsmouth, Hants., 7.viii.204, I. Thirlwell. Fig. 4. *Choreutis nemorana* (new to Britain), Hyde Park, London, July 2014, J. De Prinz. Fig. 5. *Endotricha flammealis*, Thatcham, Berks., 13.vii.2014, N. M. Hall. Fig. 6. *Idaea elongaria*, (new to Britain), Covingham, Swindon, Wilts., 19.vi.2012, leg. W. Clinch, exhibited by D. Brotheridge.

vernalis (L.) (Geotrupidae), Wickham Common nr Fareham, SU5810, 7.vi.2014, in MV trap, leg Kevin Coker, exhibited on his behalf, a green form that is not known to occur in the British Isles and is possibly an import, via the local horse riding community, from south-east Europe where this form occurs (Plate 7, Fig 9).

FOSTER, A. P. – *Trichonyx sulcicollis* (Reichenbach) (Staphylinidae), Cobham Woods, Kent, TQ686668, 4–25.vi.2014, in vane trap on root plate of fallen beech, possibly the first Kent record for this Red Data Book species. *Odonteus armiger* (Scopoli) (Geotrupidae), Oak Wood, Box Hill, Surrey, TQ186511, 8.v–19.vi.2014, in vane trap on fallen ash in woodland. *Athous subfuscus* (Müller) (Elateridae), Box Hill, Surrey, TQ180514, 6.v.2014, beating rowan blossom, one of several examples seen at this site by sweeping and beating. *Trachys troglodytes* Gyllenhal in Schönherr (Buprestidae), Box Hill Surrey, TQ177521, 30.ix.2014, in suction sample from calcareous grassland where devil's-bit scabious was absent, although there are historic records from the North Downs (Kent), most other records are from the Breckland of East Anglia. *Opilo mollis* (L.) (Cleridae), Cobham Woods, Kent, TQ690685, 25.vi–16.vii.2014, in vane trap on veteran oak. *Palorus subdepressus* (Wollaston) (Tenebrionidae), Cobham Woods, Kent, TQ686668, 16.vii–22.x.2014, in vane trap on root plate of fallen beech, one of several modern records for this species from saproxylic habitats in the wild, previously it was primarily regarded as scarce synanthropic insect associated with stored products.

HAWKINS, R. D. – *Lamprohiza splendidula* (L.) (Lampyridae), Les Nonnières, Drôme, France, female, 5.vi, male, 9.vi.2014. A European species of glow-worm that was once claimed to be found in Kent. It is yellow-brown and smaller than *Lampyris noctiluca* (L.) but emits a similar light. Five glowing females were found amongst stones on roadsides at altitudes between 830 and 930 metres in the pre-alpine range of the Vercors in south-eastern France. One was accompanied by a male. A female in captivity continued to glow throughout each night (10pm–5am) but only lived for a further four days, since the species does not feed as an adult.

TELFER, M. G. – *Soronia oblonga* C. Brisout de Barneville (Nitidulidae), **new to Britain** (with *S. grisea* (L.) and *S. punctatissima* (Illiger) for comparison). Windsor, Berkshire (VC 22), 13.ix.2013. Two males at a sap-run on oak. *Carpelimus nitidus* (Baudi di Selve) (Staphylinidae), **new to Britain**, Dungeness RSPB Reserve, East Kent (VC 15), TR065183, 28.viii.2010, one female on silty pit margin. A *Corticaria* species new to science, with similarities to *C. anatolica* Johnson (Latridiidae). Great Billington, Bedfordshire, (VC 30), SP942 226, 7.vii.2006, one male sieved from old thatch of a cottage that was being re-thatched, **new to Britain**. *Corticaria inconspicua* Wollaston (Latridiidae), determination confirmed by Wolfgang Rücker in November 2014, Great Billington Bedfordshire (VC 30), SP942226, 23.vi.2006, one female sieved from old thatch of a cottage that was being re-thatched. *Diachromus germanus* (L.) (Carabidae), Peasmarsh, TQ892240, 20.vi.2014, two seen on a visit with John Paul to a site discovered by Gordon Jarvis on 25.vi.2013. *Bembidion inustum*

PLATE 8 (*continued*). Fig. 7. *Perizoma blandiata*, Cairngorm, Scotland, ex larva, August 2013, C. Hart. Fig. 8. *Pseudocoremia suavis*, nr Helston, West Cornwall, 27.viii.2014, N. Gill. Fig. 9. *Anania hortulata*, Teignmouth, Devon, 10.vii.2014, R. F. McCormick. Fig. 10. *Idaea biselata*, Orlestone, Kent, 07.vii.2014, leg. J. Knowler, exhibited by S. Clancy. Fig. 11. *Macraria notata*, Farley, Wilts., 21.viii.2014, leg. L. Evans, exhibited by D. Brotheridge. Fig. 12. *Tyria jacobaeae*, Dungeness, Kent, 10.vi.2014, S. Clancy. Fig. 13. *Hyphantria cunea* (new to Britain), Stevenage, Herts., 29.ix.2014, leg. Ben Sale, in coll. C. W. Plant. Fig. 14. *Crocallis elinguaria*, Wicken, Cambs., 26.vii.2014, A. Jenkins. Fig. 15. *Aedia funesta* (new to Britain), Kingsdown, Kent, 13.vi.2014, leg. N. Jarman, exhibited by S. Clancy. Fig. 16. *Ochropleura plecta*, Longbridge Deverill, Wilts., 30.vii.2014, leg. R. Creighton exhibited by David Brotheridge. Fig. 17. *Omphaloscelis lunosa*, Dungeness, Kent, 01.x.2014, S. Clancy. Fig. 18. *Pungelaria capreolaria* (new to Britain in 2014), Dymchurch, Kent, 20.v.2014, J. Owen. Fig. 19. *Coenophila subrosea*, Borth Bog, Cardiganshire, bred August 2014 ex larva, D. Wilson.

Jacquelin du Val (Carabidae), Llandre, Ceredigion, (VC 46), SN628868, 21.iv.2014, the fourth British specimen, found by Eloise Austin on a patio, determined by Kevin Austin, published in *The Coleopterist* **23**: 70–71. *Harpalus griseus* (Panzer) (Carabidae), Croxton Hall Farm, Thetford, West Norfolk (VC 28), TL8685, found dead on 23.viii.2012, this species has been established at this Breckland site since at least 2008 but few individuals have been seen. *Trogoderma granarium* Everts (Dermestidae), numerous larvae were imported in June 2014 to Huddersfield in a container of clothing (made of synthetic fabrics) from Bangladesh, a few adults have been reared. *Hypulus quercinus* (Quensel) (Melandryidae), Croft Castle National Trust estate, Herefordshire (VC 36), SO442 658, 1.vii.2014, an elytron found in red-rotten heartwood of a pollard oak amidst a dense (and soon to be felled) conifer plantation.

Hemiptera

Bantock, T. M. – (1) *Psammotettix alienus* (Cicadellidae) (Dahlbom) = *Psammotettix striatus* sensu Le Quesne. Two males swept from grassland in Barrington, Cambs (TL3950) on 13.viii.2014. There are very few published records of this species. (2) *Ortholomus punctipennis* (Lygaeidae) (Herrich-Schäffer). A strong colony found on lichen heath near Hersden, Kent (TR2061) on 24.vii.2014. A very scarce and localised species with recent records from less than five sites.

Dickson, R. J. – *Trichochermes walkeri* Förster (Triozidae), Old Winchester Hill NNR nr West Meon, SU6420, South Hampshire (VC 11), 8.ix.2014, beaten from purging buckthorn; *Graphocephala fennahi* Young (Cicadellidae); West Walk nr North Boarhunt, SU6012, South Hampshire (VC 11), 21.vii.2014, beaten from *Rhododendron ponticum*; *Acericerus vittifrons* Kirschbaum (Cicadellidae) Old Winchester Hill NNR nr West Meon, SU6420, South Hampshire (VC 11), 25.vii.2014, MV, Fareham Moth Group; *Pediopsis tiliae* (Germar) (Cicadellidae) ♀♀; Bishop's Inclosure nr Shirrell Heath, SU5814, South Hampshire (VC 11), 19.ix.2014, MV light, Fareham Moth Group; *Tettigometra impressopunctata* Dufour (Tettigometridae), Old Winchester Hill NNR nr West Meon, SU6420, South Hampshire (VC 11), 22.ix.2014; *Empicoris vagabundus* (L.) (Reduviidae) Old Winchester Hill NNR nr West Meon, SU6420, South Hampshire (VC 11), 22.ix.2014; *Megalocoleus tanaceti* (Fallén) (Miridae), Milton Common, Portsmouth, SU6700, South Hampshire (VC 11), 5.ix.2014, swept from tansy.

Flanagan, J. – Display of Hemiptera: Heteroptera: (1) *Ceraleptus lividus* Stein (Coreidae) new to Yorkshire from ex-colliery land south of Little Houghton, Barnsley (SE4205) on 1.vi.2014. (2) *Nysius huttoni* White (Lygaeidae) new to South Yorkshire from brownfield sites in Sheffield (VC 63). e.g. brownfield land off Rockingham St, Sheffield (SK3487): female on 28.ix.2014. (3) *Nysius huttoni* White (Lygaeidae), new to Derbyshire from Grove Farm former landfill, Stanton-by-Dale, Derbyshire (VC 57) (SK4538) on 18.vi.2014. (4) *Chlamydatus evanescens* (Boheman) (Miridae). Second record for Derbyshire at Grove Farm former landfill, Stanton-by-Dale, Derbyshire (VC 57) (SK4538) on 18.vi.2014. Display of Hemiptera: Auchenorrhyncha: (1) *Hardya melanopsis* (Hardy) (Cicadellidae) new to South-west Yorkshire (VC63). Three specimens from Hunshelf Bank, Stocksbridge, Sheffield (SK277990) on 7.ix.2014. (2) *Sagatus punctifrons* (F.) (Cicadellidae) new to Nottinghamshire (VC 56) from Misson Carr Nature Reserve (SK7197) on 1.vii.2014.

Foster, S. – Hemiptera: Auchenorrhyncha – Idiocerinae of Western Europe.

The Idiocerinae are a subfamily of the Cicadellidae with 13 genera and 37 recognised species in Western Europe. Eight of these genera and 22 of these species occur in Britain. The taxonomy of the group has been revised extensively such that

the single genus *Idiocerus* as it appears in the RES Handbooks is now represented by 8 genera and the species list amended through synonymy and by the addition of species new to Britain. The purpose of the exhibit is to seek help in obtaining specimens for dissection and photographic recording and testing of draft keys to the identification of genera and species currently recognised in Britain and countries adjacent to Britain. The exhibit provides photographs from the draft keys with indicative key characters for the genus *Tremulicerus*.

HAWKINS, R. D. – The single British species of Alydidae, *Alydus calcaratus* (L.), was contrasted with another species in the family, *Camptopus lateralis* (Germar) that is common in southern Europe. *Alydus calcaratus* was tapped from lucerne on a bank of a motorway-like road (Dartford bypass), near Crayford, West Kent, TQ5073, 5.x.2014. *Camptopus lateralis* specimen from Marais des Bouligons, Drôme, France, 9.vi.2014.

KIRBY, P. – Three species of Hemiptera **new to Britain** from Peterborough:

(1) *Orius horvathi* (Reuter) (Anthocoridae) beaten from Austrian Pine *Pinus nigra* at Westwood, Peterborough, VC 32, TL17339977, 10.vii.2014 and 25.vii.2014.

Orius horvathi is a widespread species in Europe and it is rather surprising that it has not been recorded in Britain before. It has no obligatory association with any particular species of tree and its apparently close association with Austrian Pine at its Westwood site probably reflects no more than the abundance of prey on these trees compared to the surrounding urban habitats. There are many gardens in the immediate vicinity which provide a plausible route of introduction with nursery plants.

(2) *Psallus anaemicus* Seidenstücker (Miridae) beaten from Turkey Oak *Quercus cerris* at Thorpe Park, Peterborough, VC 32, TL17029830 on 28.vi.2014.

(3) *Psallus helenae* Josifov (Miridae) beaten from Turkey Oak *Quercus cerris* at Thorpe Park, Peterborough, VC 32, TL17029830 on 16.vi.2014.

Both *Psallus* species are widespread in Central Europe. The host trees are probably in fact introgressed hybrids of Turkey Oak and Cork Oak *Quercus suber*, sometimes loosely referred to as Lucombe Oak, although this name strictly applies only to the first generation hybrid *Quercus* × *crenata*. The trees from which they were captured are mature and not close to recent plantings or any obviously possible point of introduction. It seems likely that *P. anaemicus* and *P. helenae* have been established for some time, and may be widespread.

TELFER, M. G. – *Dicyphus tamaninii* (Wagner) (Miridae), **new to Britain**. Determination confirmed by Tristan Bantock. Crystal Palace Park (TQ348 708, West Kent, VC 16), 23.viii.2013. Three males by general sweeping.

THIRLWELL, I. R. – Photos of the genitalia of some leafhoppers (Cicadellidae), taken from the exhibitor's moth trap in Portsmouth. This is an experimental project, driven by an interest in the other insect orders coming to the trap and the need to make the identification by dissection. After removal the abdomens are cleared in KOH, washed in water and dissected in glycerin. The parts are then placed on a flat or excavated slide with a drop of glycerin and placed under a compound microscope with a digital camera attachment and Nikon DSLR. In some cases a small cover slip is placed over the dissection. A series of photos is taken at several focus stops of the microscope and the images combined to produce a focus-stacked image using Helicon Remote and Helicon Focus from HeliconSoft. The image is then cropped and cleaned in Photoshop as necessary.

HYMENOPTERA

DICKSON, R. – Various Hymenoptera taken in South Hampshire (VC 11) in 2014. *Stauropoctonus bombycivorus* (Gravenhorst) (Ichneumonidae), Old Winchester Hill

NR nr West Meon, SU6421, South Hampshire (VC 11) 25.vii.2014, at MV light; *Enicospilus inflexus* (Ratzeburg) (Ichneumonidae), Fareham SU577070, South Hampshire (VC 11), 29.vi.2014, suburban MV trap, leg. K. J. Wheeler; *Calameuta filiformis* (Eversmann) (Cephidae), Titchfield Haven NNR, SU5302, South Hampshire (VC 11) 6.vi.2014, swept from reeds at dusk; *Ophion longigena* Thomson (Ichneumonidae) ♂, Titchfield Haven NNR, SU5302, South Hampshire (VC 11) 11.vii.2014, at MV light, Fareham Moth Group; *Alleiodes praetor* (Reinhard) (Braconidae) ♂, Funtley nr Fareham SU56508, South Hampshire (VC 11) 28.vii. to 7.viii.2014, MV, leg. Maurice Opie, determined by Mark Shaw; *Apethymus serotinus* (O. F. Muller) (Tenthredinidae) ♀♂, Denny Wood, New Forest, SU3306, S. Hampshire (VC 11), 5.viii.2014, MV, leg. Fareham Moth Group; *Lasioglossum prasinum* (Smith) (Apidae) ♂♂; Browndown north nr Lee-on-Solent, SZ5899, South Hampshire (VC 11), 28.vii.2014, swept from sunlit bracken.

HALSTEAD, A. J. – Some local or scarce sawflies taken in 2014. Pamphiliidae: female *Pamphilius vafer* (L.) swept, 6.vi.2014, River Feshie by the airstrip, nr Lagganlia, Easterness, NH852025. Argidae: male *Arge expansa* (Klug), swept, 2.vi.2014, wood nr Kinchurdy Farm, Boat of Garten, Moraysh., NH936177. Diprionidae: female *Diprion similis* (Hartig) swept from Scots pine, 19.iii.2014, Woodham Common, nr Woking, Surrey, TQ014598. Tenthredinidae: male and female *Brachythops wuestneii* (Konow) male B. Ismay col., swept 1.vi.2014, Tromie Bridge Meadow, nr Drumguish, Easterness, NH789995; female swept 4.vi.2014, roadside nr Cairn Gorm, Easterness, NH984083. Female *Heptamelus ochroleucus* (Stephens) swept from ferns, 19.vi.2014, Gracious Pond, nr Chobham, Surrey, SU986641. Female *Tenthredo velox* (F.) swept, 2.vi.2014, Kinrara Marsh, Easterness, NH882098. Female *Nematus miliaris* (Panzer) swept from willow, 24.viii.2014, Heather Farm, Mimbridge, Surrey, SU994607. Male and female *Nematus umbratus* Thomson, male swept 8.vii.2014, Llyn Geirionydd, Caerns, SH761603; female A. Stubbs col., 8.vii.2014, wood W of Menai Bridge, Anglesey, SH543714.

PICKLES, T. – An unidentified hymenopteran rescued from a swimming pool some 20km inland from Frejus, France. Identified at the exhibition as probably *Campsomeris* (*Scolia*) *quadrimaculata* (F.), family Scoliidae.

DERMAPTERA

HAWKINS, R. D. – Two uncommon wingless earwigs, both males and easily separable by their cerci. *Forficula lesnei* Finot, Winnersh, Berkshire, SU7870, 14.ix.2014, on bank by up platform of railway station. *Apterygida media* (Hagenbach), near Crayford, West Kent, TQ5073, 5.x.2014, tapped from isolated hawthorn bush in grassy field.

NEUROPTERA

HAWKINS, R. D. – Two species of *Libelloides* (Ascalaphidae) from hilly areas of south-eastern France. These are large insects resembling ant-lions but with patches of yellow and black on their wings. They were seen flying up and down in the manner of hawker dragonflies. *Libelloides coccajus* (D. & S.), Jansac, Drôme, France, 5.vi.2014, at 675 metres altitude; *Libelloides ottomanus* (Germar), Archiane, Drôme, France, 8.vi.2014, at 787 metres.

Trichoptera

Dickson, R. J. – Some caddisflies taken by the exhibitor's local moth group, illustrating that these insects can now be tackled using the new R.E.S. Handbook. *Phryganea grandis* L. (Phryganeidae) ♂, Titchfield Haven NNR, SU5302, South Hampshire (VC 11), 6.vi.2014, MV light, Fareham Moth Group (Plate 7, Fig 10); *Stenophylax permistus* McLachlan (Limnephilidae) ♂, Leachpond Copse, Botley Woods nr Funtley, SU5409, South Hampshire (VC 11), 24.x.2014, Fareham Moth Group; *Trichostegia minor* (Curtis) (Phryganeidae); Titchfield Haven NNR, SU5302, South Hampshire (VC 11), 6.vi.2014, MV light, Fareham Moth Group; *Grammotaulius nigropunctatus* (Retzius) (Limnephilidae), Chilling Cliffs nr Hook, SU5103, South Hampshire (VC 11), 5.ix.2014, MV light, Fareham Moth Group; *Rhyacophila dorsalis* (Curtis) (Rhyacophilidae) ♂, Botley Woods nr Funtley, SU5409, South Hampshire (VC 11), 17.x.2014, MV light, Fareham Moth Group.

General

Crowley, L. (University of Bath). – Work experience at the Centre for Pollination Studies, Calcutta University, India. A description of some of the entomological work the exhibitor was involved with at the University of Calcutta during September 2014 as part of his undergraduate placement experience.

George, C. – A photograph of a very small 'limpet'-shaped object, possibly a scale insect attached to a piece of chalk rock found in a quarry at Brook Down, Isle of Wight, mid June 2014. After the exhibition, Chris Malumphy (Defra) commented that 'the specimen in the photograph superficially resembles a soft scale (Hemiptera: Coccidae) in the genera *Parthenolecanium* or *Saissetia*. However, there is no sign of an anal cleft or anal plates and therefore I do not believe it is a coccid but suspect that it may be an insect egg case. For example, some psocopterans produce hard protective covers over their eggs.' The exit hole may have been made by a hymenopterous parasitoid but this is far from certain.

Fullwood, D. (Quekett Microscopical Club). – Insects in Amber. Amber is fossilised resin that exuded from the bark of trees. The resin protects the tree by sealing damage to the bark, and its antiseptic properties protect the tree from disease and fungal growth. Its sticky texture, and gap-filling properties also help prevent insects from attacking the host tree. The resin would have flowed down the trunk, sometimes engulfing insects on the way. Eventually the amber fell to the ground, became incorporated in the forest floor sediment, and over millions of years became fossilised.

Amber is found in many parts of the world with some of the largest deposits in the Baltic areas of Europe and the Dominican Republic of the Caribbean. These are about 40 million and 20 million years old, respectively. The oldest recorded amber is from the Late Carboniferous, but this is quite rare. The oldest amber with insect inclusions is from the Early Cretaceous. Baltic amber is probably the best studied amber, but over the past few years a lot of work has also been carried out on the other deposits, particularly the Burmese.

The exhibit was of a small selection of Baltic amber, containing an interesting variety of insect inclusions. An Olympus SZ4045 stereo microscope and various microscope accessories were provided to facilitate their examination.

Kaunang, J. F. & Collins, G. A. – A display on Oxted Sandpit in Surrey showing some species of interest recorded during visits in 2012. Central to this display was the monitoring of a large, established Sand Martin colony which is confined to one cliff within the sandpit. This colony has been the focus of objections

from both organisations such as the RSPB and the Surrey Bird Club, as well as concerned individuals, regarding a planning application to commence infilling with inert waste and subsequent restoration of this former mineral working. A short film of the Sand Martins flying to and from their nesting holes was shown on a monitor and notable insects were displayed including a bee species new to Surrey – *Colletes cunicularius* (L.). There was also a summary account of the previous two years of the campaign, a copy of the RSPB's letter of representation and photographs of both views within the sandpit and some interesting species. This included a photograph of the cliff with the Sand Martin nesting holes which were ringed with a colour to mark holes that monitoring, by the use of video, had confirmed were used in 2014. At 59 occupied burrows this is thought to be one of the largest colonies in Surrey.

SIMS, I.[1], SUTTON, P.[1], WILLETTS, C.[1], SHORTALL, C.[2] & VERDON, P.[3] ([1]Syngenta International Research Centre, Bracknell, [2]Insect Survey, Rothamsted Research, Harpenden, [3]Regent's University London). – Recent population declines of once-common ground-dwelling, grass feeding Lepidoptera from arable field margins are weather-related. Meadow-inhabiting moths which are univoltine, have ground-dwelling larvae that feed on low-growing plants, and either overwinter as early instar larvae or pupate underground, are at risk from prolonged soil waterlogging, flooding of food plants and microbial attack. Data for 2006 to 2013 from four Rothamsted Insect Survey light traps located in southern England suggested that numbers of these moths declined with increasing rainfall. A control group of moths with different life-cycle strategies showed no such correlation.

WARING, P. – The second Afrotropical Lepidoptera Congress and Workshop, Uganda, October 2014. The first Afrotropical Lepidoptera Congress &Workshop took place in Nov.–Dec 2011 in Ghana. A second Afrotropical Lepidoptera Workshop & Congress is reported here. It took place from 19–25th October 2014, at Makerere University Biological Field Station in Kibale Forest, Uganda, with an excursion from 25th to 29th October 2014 to Mpanga Forest, an hour's drive south-west of Kampala.

The three main aims of this second Congress were to share information about Afrotropical Lepidoptera by means of seminars; to build interest and the capacity to conduct entomological study within the region; and to initiate and encourage collaborative projects between East African residents and foreign researchers.

The seminars at the Field Station in Kibale Forest took place from 2.00–4.30pm, leaving the mornings and evenings deliberately free for field work, laboratory work and writing up notes and observations. The seminars covered a range of topics, from classical taxonomy to biogeography and ecology.

The fieldwork involved light-trapping for moths to assist with species inventory work for the forest, day-time survey of the butterflies, and a search for caterpillars which was partly a survey and partly a tutorial introduction to caterpillar identification, behaviour and ecology.

Reports of the Congress are now being written for entomological journals. Now the work begins to maintain the links, the momentum and the working relationships which have been forged during the Congress, to achieve a greater capacity for field entomology within Africa and meaningful conservation of the habitats which are known to be important for Lepidoptera.

This exhibit included a group photograph of the Congress participants and photographs of a selection of species of Saturniidae, Sphingidae and Cossidae light-trapped by the author in Kibale Forest.

WILSON, D., HARMER, A. S., PICKLES, A. J. – An exhibit celebrating the centenary of F. W. Frohawk's classic work: '*Natural History of British Butterflies*'. Although

not published until 1924, it was first announced in the 'The Field, The Country Gentleman's Newspaper' in Vol. 124. – Dec. 26, 1914. The editorial introduction mentioned that the war had postponed publication of the book and featured several illustrations, including the Swallow Tail and Camberwell Beauty, to entice their subscribers. It stated that Mr Frohawk's first article would appear in their January 2 1915 issue and that five hundred illustrations from the fourteen hundred in the book had been selected. Several copies of these extremely rare 'Field' articles were displayed. The original dust wrappers for the two volumes were not very robust; as a consequence not many have survived. To commemorate the centenary of this *magnum opus* by one of the Society's most famous members, the three exhibitors have collaborated in the production of facsimile replacement dust wrappers for the two volumes, a sample of which was included in the exhibit.

SHORT COMMUNICATION

***Closterotomus trivialis* (A. Costa) (Hemiptera: Miridae) established in Oxford.** – I recently wrote on the capture of a single, male example of this species in New Marston Meadows, Oxford (SP517079) (Ryan, 2012). This was the first published record of the bug outside London, from where there had been many records since it was first reported as new to Britain (Bantock, 2010a). Subsequently, the animal has been reported in South-west Yorkshire (VC63) and Westmoreland (VC69) (Flanagan, 2013). However, nymphs have only been reported from London (Bantock, 2010b), and there is interest in whether this species can establish itself outside the environment of urban gardens, and if so on what plants it breeds. My Oxford specimen could have been a vagrant from the nearby University Parks and college gardens.

I was therefore pleased to beat two nymphs of *C. trivialis* from hawthorn, *Crataegus* spp. (Rosaceae), in New Marston Meadows on 30 May 2014, about 100m from my first capture in 2011. I also beat an adult female from nearby ash, *Fraxinus* spp. (Oleaceae). The nymphs were reared at home, and within 24 hours produced a male and female of the species. Further adults of the bug were taken over the next fortnight: a male by sweeping meadow on 10 June; a female from the head of meadowsweet *Filipendula ulmaria* (L.) Maxim. (Rosaceae), and two more females beaten from hedgerow on 11 June; and a female by sweeping a sparsely vegetated muddy area, whilst collecting shore bugs (Saldidae) (Ryan, 2015) on 14 June.

Clearly, *C. trivialis* is breeding in New Marston Meadows, and may have been established for several years. Hawthorn can be added to the list of its British host plants. – R. P. RYAN, 38 St John Street, Oxford, OX1 2LH (email: RobRyanBugs@gmail.com).

REFERENCES

Bantock, T. M., 2010a. *Closterotomus trivialis* (Costa) in north London. *Het News* **15**: 3.

Bantock, T. M., 2010b. *Closterotomus trivialis* - London update. *Het News* **16**: 9.

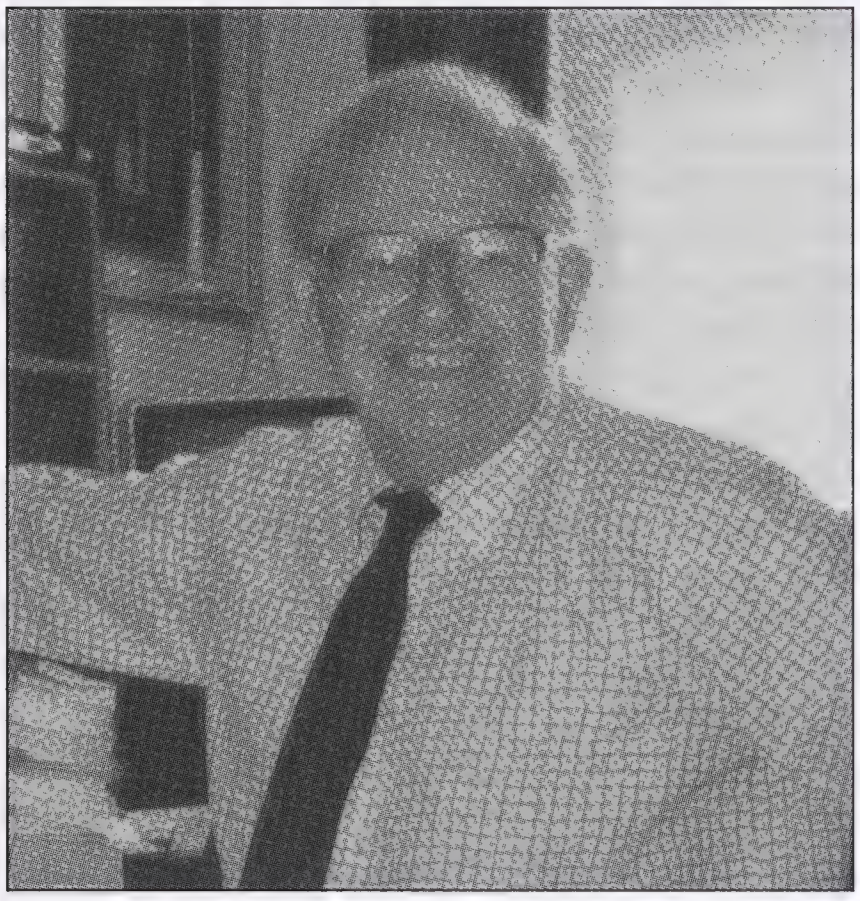
Flanagan, J. 2013. *Closterotomus trivialis* in N of England. *Het News* **19/20**: 9.

Ryan, R. P. 2012. *Closterotomus trivialis* (A. Costa) arrives in Oxford and *Agnocoris reclairei* (Wagner) returns (Hem., Miridae). *Entomologist's Record and Journal of Variation* **124**: 277–278.

Ryan, R. P. 2015. A shore bug bonanza in Oxfordshire and *Saldula opacula* (Zetterstedt) (Hemiptera: Saldidae) new to the county. *British Journal of Entomology and Natural History* **28**: 57–58.

OBITUARY

Brian Oliver Cordery Gardiner
1923–2014



Brian Gardiner passed away at Addenbrooke's Hospital in Cambridge on 17 October 2014, aged 91. He was one of the last entomologists of the old school, a field naturalist, scientist, author and editor, doyen of livestock breeders, leading authority on the Large White butterfly, and consummate bibliophile. He became a member of the South London Entomological Society in 1959, having joined the Amateur Entomologists' Society (AES) in 1939 and then the Royal Entomological Society (RES) soon after World War 2.

Brian was born in Enfield, in the old county of Middlesex, on 10th March 1923 to Oliver, an engineer, and Annie (née Mitchell). His grandfather was the renowned historian Samuel Rawson Gardiner, a leading authority on the Puritan Revolution, who traced his descent from Oliver Cromwell.

When Brian was a year old, the family moved to Kearnsey, just outside Dover, occupying a comfortable house with a large and well-wooded garden, which was bounded on one side by a railway cutting. It was there that Brian later described "...vast numbers of butterflies..." so many that he only had to lean over the fence and wait for them to fly into his outstretched butterfly net. His mother spoke of an early entomological exploit, when the six or seven-year-old Brian took a dislike to a certain Mrs Blackie, wife of the local bank manager, during one his mother's tea parties. He went off into the cabbage patch, collected some caterpillars (*Pieris brassicae*?) and proceeded to put them onto the back of the good lady, much to his mother's horror. "No doubt I was suitably chastised, but if so, it did not put me off collecting caterpillars", he wrote.

After attending St. George's Kindergarten and Sandgate Preparatory School, Brian was sent to Uppingham from where, at the age of 16, he had his first entomological notes published in 1939; the year that he also joined the Amateur Entomologists' Society. During the early years of the war he recounted catching a bilateral gynandromorph Holly Blue under "occasional desultory artillery fire" at

Kearnsey, where a rail-mounted gun was firing across the Channel and attracting return salvos from France. On another occasion he was awoken by a large chunk of German shrapnel that had come through the bedroom roof, landing on his pillow just an inch or two from his head.

After leaving School in 1941 he went to read medicine at St. Bartholomew's Hospital Medical School in London. After gaining a first MB he determined not to pursue a medical career but instead to follow his passion for entomology, and jumped at the offer of a temporary post under Norman Riley in the Department of Entomology at the British Museum (Natural History). During this time he had his first experience of editing Journals, becoming assistant editor of the AES Bulletin with Beowulf A. Cooper from 1946 to 1949. During that time he had a holiday (unusually for 1948) in Tunisia, from where he brought back a fine collection of beetles. He secured a job with the Agricultural Research Council (ARC) under Professor Sir Vincent Wigglesworth, and moved to Cambridge which was to become his permanent home. It was here that he met and married (in 1951) Doris, his wife of 63 years.

The 1950s were a busy and prolific period for Brian, who became an enthusiastic collector and recorder, particularly at Monks Wood and at Wicken, Holme, Woodwalton and Chippenham Fens. He often recorded species new to these localities, well-known though they were, becoming something of an authority on the Lepidoptera of Cambridgeshire, publishing widely on the subject. He was often accompanied on moth trapping or field excursions by well-known entomological names including Claude Rivers, Teddy Pelham-Clinton, John Heath or Eric Classey.

Due to his familiarity with the fenland fauna and a growing reputation as a livestock breeder, it was natural that in 1954 the National Trust should ask him to assist in rearing sufficient swallowtails, sourced from the Norfolk Broads, for a re-introduction programme to Wicken Fen. Over a period of eight years he was able to provide many hundreds of butterflies for release and although the project did not ultimately meet with success, the reason for this was evidently the unsuitability of the habitat rather than a shortage of supply of specimens.

At the same time he was beginning his long-standing association with the Large White *Pieris brassicae*, used in his professional life as a laboratory culture insect. He became the first person to succeed in breaking diapause in this species and so commenced a continuously brooded culture that he was able to sustain with up to eight generations per year for over 30 years, until after his retirement. With his colleague W. A. L. David he published numerous papers on the species, many focusing on its interactions with granulosis virus.

The long-running year-round breeding programme of *P. brassicae* threw up problems in continuously supplying them with fresh food, while keeping them free from the pathogens liable to be introduced with live foodplants and meanwhile maintaining the consistency required when using them as a subject for research. These difficulties were addressed during the 1960s, as Brian helped pioneer the use of completely artificial diets for rearing Lepidoptera, successfully demonstrating their use first with *P. brassicae* and subsequently with a range of other species including *Acherontia atropos* and *Cacoecimorpha pronubana* (Tortricidae). This work led to a collaboration with Philip Harris Biological Ltd. who marketed the 'Harris Pieris culture kit', combining Brian's live *P. brassicae* eggs with a supply of frozen artificial diet for the use of schools and colleges wishing to conduct their own rearing experiments. Brian also wrote an accompanying booklet.

A further innovation in year-round breeding was the use of 'artificial flowers' (painted Perspex discs with a central tube filled with sugar solution) that allowed

adult butterflies to feed without the troublesome and expensive necessity of sourcing sufficient nectar-rich flowers. Such was Brian's success with *P. brassicae* that he was able to provide the 30,000 larvae required for an educational examination, in the space of just three weeks. Never one to rest on his laurels, he set up his own entomological enterprise, Cambridge Biotech Supplies, adding locusts and cockroaches to his breeder's stable – housed in a purpose-built garden shed. All of the major entomological suppliers engaged his services as a reliable source of livestock, including Michael Dickens at Newman's Bexleyheath butterfly farm and Robert Goodden at Worldwide Butterflies, who became a life-long friend.

A further development in his association with *P. brassicae* was the chance occurrence, within the laboratory culture, of new aberrations. Most notable amongst these were the exquisite blue-winged form ab. *coerulea*, the yellow-winged ab. *jauni*, and an albino variety, ab. *albinensis*. By selectively breeding these, he was able to determine the genetic origin of each form, and to produce unique and remarkable crosses such as *coerulea*/*albinensis* (1963). Colleagues and contacts from the world over would periodically supply him with new races of *P. brassicae* including the boldly marked *cheiranthi* from the Canary Islands, which provided further striking hybrids. The addition of food dyes to the diet medium prompted the emergence of garishly coloured 'whites'; on more than one occasion he spotted traders attempting to pass off these curiosities as genuine aberrations. The 'Cambridge Stock' as it was known also spawned a good number of gynandrous and homeotic specimens and he built up an unrivalled collection of this species which was later donated to the Royal Entomological Society.

Perhaps the most extraordinary moment arising from his work with *P. brassicae* was the time he found himself on stage with Mick Jagger during a Rolling Stones concert. The occasion of course was the memorial concert for Brian Jones in Hyde Park in 1969, when as a tribute to the late guitarist, 3,000 white butterflies were to be released. There was probably no-one else who could have been asked to supply such a large number of adult butterflies to be ready on a particular day (boxes of chilled butterflies were stowed in the garage to ensure their survival until their big day), and he can be seen in footage of the event, standing stage-left, wafting the insects from their containers.

Shortly after the Rolling Stones event, he transferred from the ARC Field Station in Cambridge to its Unit of Invertebrate Chemistry and Physiology based in the Department of Zoology under Dr. John Treherne. Here he began his long collaboration with Dr. (now Professor) Simon Maddrell. The work here was focused on another insect, the blood-sucking hemipteran *Rhodnius prolixus*. Their research involved the complex chemistry of respiration in this species which is a vector in South America for the deadly Chagas disease (trypanosomiasis). He became adept at rearing these insects, which this time offered quite different challenges, requiring blood from a live host which in this case was supplied by Dutch Giant rabbits and sheep (Gardiner & Maddrell, 1972). He was not squeamish about demonstrating how innocuous this procedure was by applying the bugs in their gauze-sided capsules to his own skin, and offering the same opportunity to visitors, usually to their horror.

Though busy at work and home, and by now having four children, in his spare time he was immersed in the world of amateur entomology. He was a speaker at indoor meetings of the British Entomological and Natural History Society and a contributor to the society's journal and its annual exhibition. A "lively and, at times, heated discussion" is recorded as having followed a talk that he gave to the society in 1974 on the subject of commercial entomology. He became a special life member in 2009, after fifty years' continuous membership.

Throughout his life, he remained a lively correspondent and active member of many other organisations, including The Wildlife Trusts, the Society for the History of Natural History, Cambridge Natural History Society and the Linnean Society, of which he was a fellow. In particular, he served the Amateur Entomologists' Society with great distinction in many capacities, not least of which was as editor of the AES Bulletin from 1974-1994, during which period it increased in size by a hundred pages per volume and in frequency from quarterly to bi-monthly, while including colour plates as a regular feature. He was appointed president of the AES for 1977–78 and became an honorary life member in 1982.

His skills as an editor were also utilised by *The Journal of Research on the Lepidoptera*, of which he was Associate Editor for 15 years, and by the RES (of which he was a fellow), as editor of *The Entomologist* from 1989–1997. He retained a great interest in rearing insects of all kinds and successfully bred a number of silkmoth species, which others had found difficult. The culmination of this work was the publication by the AES, in 1982, of *A Silkmoth Rearer's Handbook*, which he edited and substantially revised, ensuring that it remained the standard work on this subject for many years.

As an editor and author, Brian brought rationality and common-sense to the sometimes emotional debate over the rights and wrongs of collecting insects from the wild. While editor of the AES Bulletin, he wrote of the hypocrisy of people who object to the use of butterfly nets and yet contribute to the destruction of wildlife on a much greater scale (Gardiner, 1977). Later, he reported that a reluctance to be seen carrying a net had been causing entomologists to submit incorrect records of species seen only at a distance (Gardiner, 1996b). He was keen to argue that, while collectors were being subjected to largely undeserved criticism (Gardiner, 1975; 1996a), populations of many insect species were succumbing to habitat loss; a problem that was being bypassed by wildlife laws (Gardiner, 1982a, 1982b, 1985, 1992a).

With the advent of "Butterfly Year" in 1981, Brian wrote an 'obituary' for four butterflies that had become extinct in Britain during the 20th century (Gardiner, 1981). Several years later, he observed that the county of Cambridgeshire had lost almost half of its butterfly species over the last century (Gardiner, 1988). In the meantime, however, he had shown a hint of glee when observing that the Pine beauty moth (*Panolis flammea*) was destroying exotic Lodgepole pine plantations in northern Scotland. To Brian, this represented nature fighting back against an ecologically questionable plantation policy (Gardiner, 1986). He was equally inclined to criticise ill-advised and damaging campaigns against species widely perceived as pests or weeds (Gardiner, 1999).

Though he suffered ill health in later life having suffered several heart attacks, he retained a cheerful disposition and remained active in his many interests. Towards the end of his life, although not in very good health, he greatly assisted AES Conservation Secretary, David Lonsdale, in the writing of a history of the involvement of the Amateur Entomologists' Society in conservation, for publication as a book chapter (New, 2012). Brian searched through his personal collection of back numbers of the AES Bulletin and provided David with a list of articles related to conservation, from the 1930s to the late 1960s.

Parallel to Brian's interest in entomology was a great love of antiquarian books. He built a fine collection and became an acknowledged authority on the subject. From his first published remarks on books (entitled 'Drury & Curiouser') in 1949, he maintained a scholarly interest in authors, printing methods, or the intricacies of identifying early editions, and kept a keen eye on auction prices, attending many of the great entomological sales. He had a compendious knowledge of early natural

history publishing and, when retired, took a delight in tracking down and collecting books that had escaped the attention of Freeman (1980) in his handlist. He took up bookbinding and greatly enjoyed restoring and re-binding bargains that came his way from bookshop or auction; he also bound, in matching livery, his extensive collection of journals. In later years he took readily to computing and the internet, selling many of his books on ebay, whilst acquiring almost as many. He was a frequent visitor to the bookshops of Cambridge, travelling on his trusty 1948 Humber cycle (with its original saddle!) well into his 70s.

Whether at work in the Department of Zoology at Cambridge, as an editor of journals, or in the realm of books, none of the many who came to him for help or advice were turned away. He gave generously of his time and expertise and was always keen to encourage the next generation of entomologists. The Amateur Entomologists' Society named the Gardiner Award in his honour, to reward the best contribution to the society's Junior Bug Club Magazine. Many a novice was grateful for his sage advice; equally, experienced entomologists came to his door, one such being the Hon. Miriam Rothschild looking for help with her work on plant toxins in insects, a collaboration that led to several published papers.

He is survived by his four children and widow Doris, who supported his endeavours throughout their long marriage. There was a poignant moment at his memorial service. While the mourners (who, at the family's request, sported ties or brooches with a butterfly motif) gathered, a peacock butterfly descended from the nave and alighted briefly on a pew before climbing again towards the stained glass windows; a fitting farewell gesture to a remarkable entomologist and a true gentleman.

CHRIS GARDINER & DAVID LONSDALE

REFERENCES AND SELECTED BIBLIOGRAPHY

David, W. A. L. & Gardiner, B. O. C. 1952. Laboratory breeding of *Pieris brassicae* L. and *Apanteles glomeratus* L. *Proceedings, Royal Entomological Society, London (A)* **27**: 54–56.

David, W. A. L. & Gardiner, B. O. C. 1953. The systemic insecticidal action of sodium fluoroacetate and of three phosphorus compounds on the eggs and larvae of *Pieris brassicae* L. *Annals of Applied Biology* **40**: 403–417.

David, W. A. L. & Gardiner B. O. C. 1958. Fluoroacetamide as a systemic insecticide. *Nature* **181**: 1810.

David, W. A. L. & Gardiner, B. O. C. 1965. Rearing *Pieris brassicae* L. larvae on a semisynthetic diet. *Nature* **207**: 882–883.

David, W. A. L. & Gardiner, B. O. C. 1966. Persistence of fluoroacetate and fluoroacetamide in soil. *Nature* **209**: 1367–1368.

Gardiner, B. O. C. 1939. *Herse convolvuli* at Dover. *The Entomologist* **72**: 21.

Gardiner, B. O. C. 1948. Preservation from pests. *Bulletin of the Amateur Entomologist's Society* **7**: 225–226.

Gardiner, B. O. C. 1949. An unusual collection pest. (*Tribolium castaneum*). *Bulletin of the Amateur Entomologists' Society* **8**: 3.

Gardiner, B. O. C. 1949. Drury and 'Curiouser'. *Entomologist's Record & Journal of Variation* **61**: 83 & 104.

Gardiner, B. O. C. 1949. *Ptinus tectus* Boield. (Col. Ptinidae) on dead insects. *Entomologists Monthly Magazine* **85**: 247.

Gardiner, B. O. C. 1958. Fenland's lost butterflies. *East Anglian Magazine* **17**: 585–588.

Gardiner, B. O. C. 1961. Large scale butterfly rearing. *School Nature Study* **56**: 26–28.

Gardiner, B. O. C. 1962. An albino form of *Pieris brassicae* Linnaeus (Lep., Pieridae). *Entomologist's Gazette* **13**: 97–100.

Gardiner, B. O. C. 1962. *Rothschildia jorulla* ab *semiimaculata*, ab.nov. *Coridon* **B**(3), 2–3.
Gardiner, B. O. C. 1963. Genetic and environmental variation in *Pieris brassicae*. *Journal of Research on the Lepidoptera* **2**: 127–136.
Gardiner, B. O. C. 1963. Notes on the breeding and biology of *Papilio machaon* L. (Lepidoptera: Papilionidae). *Royal Entomological Society of London, Proceedings. Series A* **38**: 206–211.
Gardiner, B. O. C. 1965. Hybrids between typical *Pieris brassicae* L. and race *cheiranthi* Hueb. *Proceedings xiii International Congress of Entomology*, 1964.
Gardiner, B. O. C. 1966. Know your Author: Brian Oliver Cordery Gardiner. *Journal of Research on the Lepidoptera* **5**: 229.
Gardiner, B. O. C. 1966. The import of Saturnidae. *Entomologist's Record & Journal of Variation* **78**: 45–46.
Gardiner, B. O. C. 1966. The rearing of *Dirphiopsis eumedide* (Saturnidae). *Journal of Research on the Lepidoptera* **4**: 287–292.
Gardiner, B. O. C. 1967. Notes on *Eacles penelope* (Saturnidae). *Journal of Research on the Lepidoptera* **5**: 177–180.
Gardiner, B. O. C. 1967. *Pieris brassicae* L. (Pieridae) established in Chile; another Palearctic pest crosses the Atlantic. *Journal of the Lepidopterists' Society* **28**: 269–277.
Gardiner, B. O. C. 1968. The butterfly sale of the century. *Entomologist's Record & Journal of Variation* **80**: 133–137.
Gardiner, B. O. C. 1972. *Pieris rapae* L. larvae throughout the winter. *Entomologist's Record & Journal of Variation* **84**: 112.
Gardiner, B. O. C. 1973. Gynandromorphism in *Pieris brassicae* L. *Journal of Research on the Lepidoptera* **11**: 129–140.
Gardiner, B. O. C. 1973. Obtaining butterfly eggs in captivity. *Bulletin of the Amateur Entomologists' Society* **32**: 159.
Gardiner, B. O. C. 1973. The insect trade. *Bulletin of the Amateur Entomologists' Society* **32**: 131–133.
Gardiner, B. O. C. 1974. A collapsible cage for use in the rearing and study of large insects. Entomologist's Gazette. **25**: 148–150.
Gardiner, B. O. C. 1974. An unusual aberration of *Pieris brassicae* (Linnaeus) Lep., Pieridae). Entomologist's Gazette. **25**: 186–187.
Gardiner, B. O. C. 1974. Food for caterpillars. *Natural Science in Schools* **12**: 8–10.
Gardiner, B. O. C. 1975. Collecting as it was, and as it is now. *Bulletin of the Amateur Entomologists' Society* **34**, 97–99.
Gardiner, B. O. C. 1977. Editorial. *Bulletin of the Amateur Entomologists' Society* **36**, 53.
Gardiner, B. O. C. 1977. Cleaning cages after diseases. *Bulletin of the Amateur Entomologists' Society* **36**: 157.
Gardiner, B. O. C. 1978. For sale – Hewitson on Butterflies, price 6d. *Proceedings &. Transactions of the British Entomological & Natural History Society* **11:** 100–102.
Gardiner, B. O. C. 1978. The preparation and use of artificial diets for the rearing of insects. *Entomologist's Record & Journal of Variation* **90**: 181–184; 267–270; 287–292.
Gardiner, B. O. C. 1978. Instar number and pupal colouration in Palestinian *Pieris brassicae* L. *Proceedings &. Transactions of the British Entomological & Natural History Society* **1**: 21–23.
Gardiner, B. O. C. 1979. A review of variation in *Pieris brassicae* (L.) (Lep., Pieridae). *Proceedings & Transactions of the British Entomological & Natural History Society* **12**: 24–46.
Gardiner, B. O. C. 1981. Editorial. *Bulletin of the Amateur Entomologists' Society* **40**, 153– 155.
Gardiner, B. O. C. 1982a. Editorial. *Bulletin of the Amateur Entomologists' Society* **41**, 57.
Gardiner, B. O. C. 1982b. Editorial. *Bulletin of the Amateur Entomologists' Society* **41**, 153.
Gardiner, B. O. C. 1982c. *A Silkmoth Rearer's Handbook. The Amateur Entomologist*, **Vol. 12**. Amateur Entomologists' Society, London.
Gardiner, B. O. C. 1984. Why are pests so rare? *Bulletin of the Amateur Entomologists' Society* **43**: 111.
Gardiner, B. O. C. 1985. ln Early Days; Being a collection of reminiscences by pre-war AES members. *Bulletin of the Amateur Entomologists' Society* **44**: 114–115.

Gardiner, B. O. C. 1985. The creaking Wildlife and Countryside Act. *Bulletin of the Amateur Entomologists' Society* **44**, 21.

Gardiner, B. O. C. 1986. Pine Beauty aids the conservation of peat bogs. *Bulletin of the Amateur Entomologists' Society* **45**, 124-25.

Gardiner, B. O. C. 1987. Rearing the painted lady *Cynthia cardui* L. with particular reference to the use of semisynthetic diet. *Entomologist's Record and Journal of Variation* **99**: 161–168; 205–214.

Gardiner, B. O. C. 1987. The true date of publication of F.W. Frohawk's natural history of British butterflies. *Entomologist's Record and Journal of Variation* **99**: 214–214.

Gardiner, B. O. C. 1988. A real menace to butterflies: the gardening correspondent. *Entomologist's Record and Journal of Variation* **100**: 250–252.

Gardiner, B. O. C. 1988. Memories of times past: 1893. *Bulletin of the Amateur Entomologists' Society* **47**, 102.

Gardiner, B. O. C. 1992a. Toothless and ineffectual – the Wildlife & Countryside Act. *Bulletin of the Amateur Entomologists' Society* **51**, 230–231.

Gardiner, B. O. C. 1992b. Oviposition and hatching in the mantid *Tendora sinensis British Journal of Entomology & Natural History* **5**: 90, Plate iv.

Gardiner, B. O. C. 1996a. Alleged overcollecting: could we have evidence and understanding please? *Bulletin of the Amateur Entomologists' Society* **55**, 203–208.

Gardiner, B. O. C. 1996b. Banned nets lead to inaccurate records. *Bulletin of the Amateur Entomologists' Society* **55**, 44.

Gardiner, B. O. C. 1996c. Letter to the Editor on the use of capital letters in the English names of flora and fauna. *British Journal of Entomology & Natural History* **9**: 63.

Gardiner, B. O. C. 1998. Butterfly resting position: *Pieris* up, *Vanessa* down. *British Journal of Entomology & Natural History* **1**: 126–27.

Gardiner, B. O. C. 1998. Some observations on two old books: Wood's *Index Entomologicus* and *Brown's Butterflies, Sphinxes and Moths. British Journal of Entomology & Natural History* **1**: 163–69.

Gardiner, B .O. C. (1999). In praise of ragwort, ivy and rabbits. *Bulletin of the Amateur Entomologists' Society* **58**, 57–58.

Gardiner, B. O. C. 2003. Reminiscences of another elderly entomologist. In: Salmon, Michael A., & Edwards, Peter J. 2005. *The Aurelian's Fireside Companion*. Paphia Publishing, Lymington, UK.

Gardiner, B. O. C. (2003). Possible source of the Madeira monarchs *Danaus plexippus* (L.). *British Journal of Entomology & Natural History* **16**: 142

Gardiner, B. O. C., & Maddrell, S. H. P., 1972. Techniques for routine and large-scale rearing of *Rhodnius prolixus* Stal. (Hem. Reduviidae). *Bulletin of Entomological Research* **61**: 505–515.

New, T. (2012) [ed.] *Insect Conservation: Past, Present and Prospects*. Springer (Netherlands), 435 pp.

Rothschild, M., & Gardiner, B. O. C., 1978. Cardioactive substances in the monarch butterfly and *Euploe core* reared on leaf-free artificial diet. *Nature* **275**: 649–650.

Rothschild, M., & Gardiner, B. O. C., 1978. The role of carotenoids in the "golden glance" of danaid pupae (Insecta: Lepidoptera). *Journal of Zoology* **186**: 351–358

Rothschild, M., Gardiner, B. O. C., Mummery, R. & Valadon, G., 1977. Carotenoids in the solitaria and gregaria phases of the locust *Schistocerca gregaria* fed on artificial and natural diets. *Journal of Zoology* **181**: 475–494.

Rothschild, M., Gardiner, B. O. C., Valadon, G., & Mummery, R. 1975. Lack of response to background colour in *Pieris brassicae* pupae reared on carotenoid free diet. *Nature* **254**: 592–594.

COUNCIL AND OFFICERS' REPORTS FOR 2014

Council Report

Council and its Meetings

The Council held seven meetings during the year, five at the Conway Hall in London and two at the Society's rooms at Dinton Pastures, near Reading. Attendances at Council meetings have been consistent, averaging 12 members.

Members of Council may be honorary officers, serving on our various subcommittees or represent the Society on other committees. Council officers currently represent the society at Invertebrate Link, Amateur Entomologists Society and Dipterist's Forum.

The President Claudia Watts has been in office since March 2014 and will continue as President until March 2016. Council would like to thank Claudia for all her hard work and commitment to the Society. Under her leadership the new BENHS website is under development.

Membership of the Society

Although 37 new members were elected, another 44 were struck off through non-payment of subscription. Fifteen members resigned during 2014 and, sadly, the deaths of five members were reported; resulting in an overall reduction in membership from 838 to 811. 676 ordinary, 7 corporate, 22 student, 41 life, 12 honorary and 53 special life members.

Three members, A. J. Fairclough, B. R. S. Morrison and N. A. Smith, have been members for fifty years and qualified for 'special life' status at the end of the year.

The apparent decrease in total membership is due to changes in the Society's Bye-laws voted through at the AGM in 2014. Members who have not paid their subscription for the year are now struck off in December rather than in the spring of the following year. Although our membership is stable, Council is aware of the need to continue to attract new members, and in particular to engage with young people with an interest in entomology.

Our new publicity leaflet, as well as a Society banner for shows and events, is in circulation and the designs have been well-received. We are most grateful to Michael Darby for his contributions to these. The Outreach sub-committee has worked hard to actively recruit new members, in particular new student members, with some success.

The Pelham-Clinton Building

The Society's headquarters at Dinton Pastures, and its contents, are major assets for the Society. The Pelham-Clinton Building houses our collections and library, and continues to be used for workshops and meetings.

Publications

The eagerly awaited second edition of *British Soldierflies and their Allies* by Alan Stubbs and Martin Drake with colour photographs by David Wilson was published during 2014.

Website and Social Media

Our website has been managed by Tony Prichard who has done sterling work in keeping the website up-to-date with news and events of relevance to our membership.

We are currently undergoing a website upgrade and hope to go live by the summer of 2015. The new design will be easier to navigate and allow for blog posts, in particular from the Society's various Groups and their meetings, amongst other new features.

Our Facebook page is increasingly used as a means of communication between members. It currently has 700 members and is a very active resource. Our Society joined Twitter in July 2014 and currently has 485 followers. We seek to actively update members and indeed the public at large on all things entomological as well as the Society's activities by various means of communication both paper and digital.

Programme of events

Many events are held for members and guests throughout the Society's year which starts with the AGM and Members Day. Another major gathering of members is, of course, our Annual Exhibition, held in 2014 on Saturday 8th November, at Conway Hall, Holborn, London. It was attended by179 visitors, of which 147 were members. The Society dinner was held at The Spaghetti House, in Holborn and attended by 28 people. The success of the Annual exhibition means we will be holding it in the same venue this year on Saturday 14th November.

In 2014 our Society organised 17 indoor workshops, of which one was cancelled due to adverse weather, 3 were held at the Angela Marmont Centre of the Natural History Museum, and 13 at Dinton Pastures. A total of 205 participants attended the 16 events which were run. In addition, the 11th Coleopterists' Day was held at Oxford and the second Hemipterists' Day was held at Dinton Pastures.

Seventeen open days were held at Dinton Pastures throughout the year.

Field meetings

The Society's Regional Meetings are co-ordinated by Claudia Watts and the Field Meetings co-ordinated by Paul Waring. Fifteen field meetings were held during 2014. A Regional Meeting with a day of talks and discussions on invertebrate topics was held at Manchester Museum, the University of Manchester on Saturday 7th June 2014.

In conclusion our Society continues to move forward dynamically and looks forward to a successful year of entomologising in 2015.

BEULAH GARNER
with contributions by other Council members

TREASURER'S REPORT
FINANCIAL YEAR TO 31 DECEMBER 2014

In 2014 income was boosted by a slight increase from investments and an increase in book sales following the publication of the second edition of *British Soldierflies and their Allies*. A substantial legacy was received from our late member Mark Middleton. A donation was received in memory of our former president, Gaston Prior. This donation and subsequent donations are royalties from *British and Irish Pug Moths A Guide to Their Identification and Biology*, of which Mr. Prior was joint author.

As mentioned in last year's report £40,000 (net £38,800) has been returned to our investments, at a cost of £1,200. To ensure that deposits at any one bank were covered by the Financial Services Compensation Scheme, a sum of £62,000 was transferred from NatWest Bank to a new Virgin Charity Account. This account earned £502 interest.

The cost of staging the exhibition was substantially reduced by moving to Conway Hall. Curation costs are greatly increased over last year and include the re-curation of the Coleoptera collection by The Oxford University Museum of Natural History, (£12,000). A grant of £500 was awarded from the Maitland Emmet BENHS Research Fund to help in the production of a handbook of the British and Irish shieldbugs. £1,000 was again donated to the Amateur Entomologists Society in support of the *Bug Club*.

Overall, running the Society produced a net deficit of £25,843. Unrealised revaluation of investments, which are stated at mid-market value on 31st December 2014, reduces the deficit to £22,110. With a Balance Sheet value of £539,638 the society remains financially healthy, able to continue its established functions and to consider new projects for the public's benefit.

I would like to thank Roger Hawkins for his continuing work with subscriptions, Tony Pickles for general advice and Alan Philips for the work he has done in the examination of the accounts.

A full set of accounts will be lodged at Dinton Pastures and may also be obtained on application to the Treasurer.

JOHN FLYNN

Statement of Financial Activities
for the year ended 31st December 2014

	Unrestricted Funds	Restricted Funds	Endowment Funds	Total Funds 31.12.14	Total Funds 31.12.13
	£	£	£	£	£
Incoming Resources					
Bequests and donations	10,232	–	–	10,232	127,988
Subscriptions	12,505	–	–	12,505	13,728
Investment Income	4,407	3,839	656	8,902	8,106
Trading Income	–	8,182	–	8,182	5,804
Sundry Income	703	–	–	703	0
Total Incoming Resources	27,847	12,021	656	40,525	155,625
Resources Expended					
Direct Charitable Expenditure:					
Cost of Journal & Distribution	12,363	–	–	12,363	12,909
Cost of Facility at Dinton Pastures	7,618	–	–	7,618	10,435
Members Meetings and Services	6,696	–	–	6,696	13,301
Library and Curation	13,754	–	–	13,754	1,459
Grants & Donations	1,500	–	–	1,500	2,750
Depreciation	4,564	2,696	–	7,260	7,597
	46,495	2,696	–	49,191	48,451
Other Expenditure:					
Management Costs	13,350	–	–	13,350	13,014
Trading Costs	–	3,827	–	3,827	763
	13,350	3,827	–	17,177	13,777
Total Resources Expended	59,845	6,523	–	66,368	62,227
Net Resources Before Transfers	(31,998)	5,498	656	(25,843)	93,398
Net Incoming/Outgoing Resources	(31,998)	5,498	656	(25,843)	93,398

Gains & Losses on Investments:					
Realised	–	–	–	–	–
Unrealised	1,848	1,610	275	3,733	27,131
Net Movement in Funds	(31,150)	7,108	932	(22,110)	120,529
Fund Balances Brought Forward At 1st January 2014	£227,401	£300,362	£33,985	£561,748	
Fund Balances Carried Forward At 31st December 2014	£197,252	£307,470	£34,916	£539,638	

Balance sheet as at 31st December 2014

	2014 £	2014 £	2013 £	2013 £
Fixed Assets				
Tangible Assets		178,885		184,607
Investments		261,621		219,088
		440,506		403,695
Current Assets				
Stocks	19,717		13,215	
Debtors	7,816		4,330	
Cash at bank and in hand	75,172		143,169	
	102,704		160,714	
Creditors: amounts falling due within one year	3,572		2,660	
Net Current Assets		99,132		158,053
Net Assets		£539,638		£561,748
Funds				
Endowment Funds – Hering Fund		34,916		33,985
Restricted Funds				
– Housing Fund	201,499		198,746	
– Special Publications Fund	100,853	302,352	100,853	299,599
Unrestricted Funds:				
Maitland Emmet BENHS Research Fund	68,156		66,824	
General Fund	134,214	202,370	161,341	228,164
		£539,638		£561,748

Tangible fixed assets	*Leasehold Property* £	*Fixtures & Equipment* £	*Total* £
Cost			
At 1 January 2014	188,736	112,469	301,205
Additions		1,538	1,538
Disposals			
At 31 December 2014	£188,736	£114,007	£302,743
Depreciation			
At 1 January 2014	48,233	68,364	116,598
Charge for year	2,696	4,564	7,260
On disposals			
At 31 December 2014	£50,929	£72,928	£123,858
Net book values			
At 31 December 2014	£137,806	£41,078	£178,885
At 31 December 2013	£140,503	£44,105	£184,608

Investments	2014 M.V. £	2014 Cost £	2013 M.V. £	2013 Cost £
Royal Dutch Shell PLC	23,670	1,250	24,168	1,250
Unilever PLC	31,667	248	29,908	248
M & G Charifund	90,203	20,238	90,264	20,238
Hendersons Bond	61,789	58,000	41,727	58,000
Architas Multi Manager	54,292	38,500	33,020	38,500
	£261,621	£118,236	£219,088	£118,236

Unrealised gains arising in the year are shown in the Statement of Financial Activities.

Funds
Analysis of net assets between funds

	Tangible Fixed Assets £	Current Investments £	Net Current Assets £	Total £
Endowment Funds:				
Hering Fund		34,916	9,562	34,916
Restricted Funds:				
Housing Fund	137,806	63,692	55,919	201,498
Special Publications		54,535	46,318	100,853
Unrestricted Funds:				
BENHS Research Fund		41,703	26,453	68,156
General Fund	41,078	66,775	23,361	131,214
	£178,885	£261,621	£99,132	£539,638

These abbreviated accounts are extracted from the Trustees' Report and accounts, a full copy of which has been lodged at Dinton Pastures and is available to members upon application to the treasurer.

JOHN FLYNN

EDITOR'S REPORT

Volume 27 of the British Journal of Entomology and Natural History was published in four parts in March, June, September and December 2014. Fewer large manuscripts were submitted during the year, but the Volume length of 264 pages was similar to recent years.

Seventeen papers, 20 short notes and eight field meeting reports were published in Volume 27 together with the usual AGM and Annual Exhibition summaries. Nearly half of the papers were on various suborders of the Hemiptera, a surprisingly high percentage given the size of the order and the interests of membership. Papers on Lepidoptera, Coleoptera and Diptera represented 18%, 12% and 9% of the total, respectively. The decline in papers on the major orders such as butterflies and moths, beetles, bees and flies is seriously worrying. In the past five years 38 insect and 15 mite species have been described as new to Britain in the journal of which 66% of the insects were bugs. This vastly underplays the significantly higher numbers of flies, beetles and moths (in the 100s) described as new to our shores during the same period. It has to be recognised that newly established recording groups over the past 20 years with taxa-specific newsletters and journals have impacted on the breadth of papers now submitted to the journal. In 2000, there were approximately equal numbers of papers on Lepidoptera, Diptera and Hymenoptera representing c. 75% of the pages of the journal; thus there has been a great shift from papers on major to minor orders. This can only be reversed by members of the Society publishing papers in the British Journal of Entomology and Natural History: it is up to you. The journal has the largest readership of journals on British insects – make use of it.

The journal has been extremely lucky to be able to publish two large papers on Coleoptera by Michael Darby (one in press) and a Presidential address by Tony Pickles which have ensured the survival of three issues of the journal. John Phillips also deserves thanks for providing an interesting and lively account of the Janson entomological dynasty.

There were nine book reviews and seven obituaries: of Robert George, Barry Harper, Neville Birkett, Chris Haes, Anthony Dobson, Mark Middleton and John Roche, kindly written by members of the Society.

Special thanks go once again to Roger Hawkins and David Young for preparing the Index to Volume 26 (2013) and to proof readers, Jolyon Alderman, Darren Mann and Adrian Knowles. I would also like to thank the Exhibition compilers for

2013, Aaron Jones, Sean Clancy, Richard Dickson, Colin Plant, Peter Chandler, Roger Booth, David Baldock and Alan Stewart for their efforts. Alec Harmer and David Wilson require special thanks for preparing the superb colour plates of insects selected for illustration at the Exhibition. I also wish to thank those who have spent their precious time refereeing papers for the journal.

I look forward to receiving more papers in 2015.

JOHN BADMIN

CURATOR'S REPORT 2014

The work on the curation of the Coleoptera collection that began two years ago continued and the layout of the main collection has now been completed. This work was carried out at the Oxford University Museum of Natural History by Steven Williams, and I am grateful to him and to Darren Mann for their interest in maintaining a high standard in this project. The total number of specimens so far curated is 48,010, which have been arranged in 112 drawers according to the latest version of the Coleoptera checklist (Duff 2012). All completed drawers have been returned and all are labelled clearly with the families and range of genera included. All specimens have been staged at a standard height, using No. 6 Austerlitz pins, labelled with the name over which they currently stand and that they belong to the BENHS. This individual labelling will facilitate future handling of specimens and verification by specialists. A database has also been created, listing all the species with the number of examples of each, which will enable quick searching of the collection via computer.

As the funding originally allocated to employ Steven Williams on this project had been used up, the Society decided that a further £6,000 should be provided for him to complete the main collection, and a similar sum to enable the Joy collection to be curated to the same standard. As work progressed it also became apparent that additional drawers would be needed to complete the job; this was expected as some of the collection had been tightly packed previously. It was estimated that about 15 further drawers would be required to facilitate completion of the main collection, and two second hand 10-drawer units in good condition were purchased for £600 each from the stock at the Oxford University Museum. Fourteen drawers from these units have so far been used and those remaining will provide some space to improve the layout of the Joy collection, the 30 drawers of which have been taken to Oxford and will be away until that work is finished. An additional order of 40,000 pins was obtained at a cost of £1,321.08; those remaining after the present project has been completed will be used for staging of other collections such as the Hemiptera.

The beetle collection of Norman Joy, which will continue to be arranged according to the classification in his *Practical Handbook of British Beetles*, was presented to the Society by him in 1933. It was reported by Eric Gardner in his account of the history of the Society's collections included in *The New Aurelians* (1973) that the Joy collection came to the Society in 1934, after the Natural History Museum had removed specimens of interest to them. Although there is no indication of the number of specimens they had removed, it was assumed till recently that the Society had the bulk of the Joy collection. However, during 2014 it was learned from Peter Hodge that there is also a Joy collection of British beetles at the Booth Museum in Brighton, which is of comparable size to the Society's holdings. This collection had

come to them from the Worthing Museum and its past history was otherwise unknown. He reported that only a few of the specimens have Joy's name on them, but the same is true of those held in the Society's collections. Any direct comparison of specimens will not be practicable while our Joy collection is at Oxford, but this will be attempted in the future. It had been understood (from the obituary by Charles Mackechnie-Jarvis) that Joy did not continue collecting after presenting his collection to the Society but he lived till 1953, latterly at Chichester which may explain the collection being at Worthing.

The Lepidoptera collection of our member John Roche was initially loaned to the Society for a few months during the summer, but became a gift from his wife when he sadly died on 8 September. The collection comprised four cabinets, which were brought from Marlow by Martin Albertini, to whom I am grateful for making four separate journeys to achieve this, and it has since been stored in the Howarth Room. The cabinets comprised one of 10 drawers, two of 20 drawers and one of 30 drawers. This was principally a collection of Microlepidoptera, but the 30-drawer cabinet contained butterflies and larger moths. There were a number of empty drawers and some gaps in the collection, and it was understood on receipt that these might be filled later by specimens in about 25 store boxes. However, it was subsequently learned that these had been sold with their contents included, and it is uncertain whether anything significant was lost in this way.

There had not been any further progress in the amalgamation of the Society's Microlepidoptera into a single collection that began in 2007, and the Pyralidae and Tortricidae remained to be arranged. This came to a halt for two reasons, initially the knowledge that a new Lepidoptera checklist was forthcoming, and then that there were no remaining empty drawers to assist with the layout. On confirmation that the Roche collection had been given to the Society, it was decided that the smaller cabinets from this collection would be used to continue the layout, starting with the Tortricidae, and layout of them according to the new checklist is expected to begin early in 2015. The Roche collection will be incorporated with the other five collections of Microlepidoptera that had already been combined for other families. It has yet to be considered to what extent reorganisation of the entire Lepidoptera collection, according to this new list, will be feasible.

Chris Spilling reports that good progress is being made with verification of the spider collection, and says that no erroneous identifications have yet been detected. It is uncertain when this collection will be returned to the Society.

I am grateful to Ivan Perry for a further significant donation of Diptera to the Society's collection. I also thank all other members who have donated specimens during the year.

A 12-drawer cabinet, with shallow drawers, that has been on sale for some years has now been sold via the Conchological Society to a restorer who will sell the cabinet on, there having been no response to an advertisement that had been on the Society's website for two years. I thank Rosemary Hill for arranging this sale and transporting it. This cabinet was not in good condition, so I was pleased to accept £75 for it.

The 30-drawer cabinet from the Roche collection, which as mentioned above, contained butterflies and larger moths, has been cleared, for which I thank Martin Albertini. This cabinet is available for sale, and an advertisement with photographs has been placed on the website. Members interested in purchasing this cabinet should view it at the Society's building, and the first reasonable offer received will be accepted.

PETER CHANDLER

Librarian's Report 2014

The main occupation in the library during 2014 has been keeping on top of new acquisitions, both purchased and donated books, and a large legacy of journals bequeathed to the Society by Peter Dyte last year. After compiling an extensive listing of what this was comprised of it was decided to retain long runs of *Zoological Journal of The Linnean Society*, *Journal of Zoology* and *The Linnean*. Various other titles of short runs of little interest to our members are to be offered to John Muggleton for the Amateur Entomologists' Society.

Some new book titles, purchased during 2013, that have been added to our holdings this year, include:

Palmer B, Porter J & Collins G	2012	Smaller moths of Surrey
Smith FHN	1997	The moths and butterflies of Cornwall and the Isles of Scilly
Smith FHN	2002	A supplement to the moths and butterflies of Cornwall and the Isles of Scilly
Bengtsson BA	2011	Lepidoptera: Roesslerstammidae – Lyonetidae
Brown P, Roy H, Comont R & Poland R	2012	Guide to the ladybird larvae of the British Isles
Foster GN & Friday LE	2011	Keys to adults of the water beetles of Britain and Ireland (Part 1) (HIBI, 4/5)
Morris MG	2012	True weevils 3: Curculionidae (HIBI 5/17d)
Wagner T (ed)	2014	Coleoptera of Europe (Vol. 1: Latridiidae – Dasyceridae)
Allen G	2009	Bees, wasps and ants of Kent
Czechowski W, Radchenko A, Czechowska W & Vepsalainen K	2012	The ants of Poland with reference to the myrmecofauna of Europe
Edwards M & Jenner M	2009	Field guide to the bumblebees of Great Britain and Ireland
Bartsch H	2009	Syrphidae/Tvavingar: Blomflugor (Vol. 1. Syrphinae)
Bartsch H	2009	Syrphidae/Tvavingar: Blomflugor (Vol. 2. Eristalinae & Microdontinae)
Brown BV & Borkent A *et al.*	2009	Manual of central American Diptera (Vol. 1, Lower Diptera)
Brown BV & Borkent A *et al.*	2010	Manual of central American Diptera (Vol. 2, Higher Diptera)
Marshall SA	2012	Flies: The natural history and diversity of Diptera
Stokland JN, Siitonen J & Jonsson BG	2012	Biodiversity in dead wood
Crothers J	2011	Snails on rocky sea shores
Sherlock E	2012	Key to the earthworms of the UK and Ireland
Richet R, Blackith RM & Pape T	2011	Sarcophaga of France (Diptera: Sarcophagidae)
Richet R, Blackith RM & Pape T	2011	Sarcophaga of France (Diptera: Sarcophagidae)
Wilson M, Stewart A, Biedermann R, Nickel H & Niedringhaus R	2014	The planthoppers and leafhoppers of Britain and Ireland
Kunz G, Nickel H & Niedringhaus R	2011	Photographic atlas of the plant- and leafhoppers of Germany/ Fotoatlas der Zikaden Deutschlands
Alexander KNA	2011	The barkflies and booklice (Psocoptera) of Cornwall & the Isles of Scilly
Cropper RS	2011	The Orthoptera and allied insects of Somerset
Barnard P	2011	Royal Entomological Society book of British insects
Bebbington J	2012	Insect photography: Art and techneques

In conclusion, I would like to thank Hans Ulrich, Brian Laurence, Mark Mitchell, Roger Hawkins and John Badmin for donations of books and/or journals during the past year.

Ian Sims

PRESIDENTIAL ADDRESS

PART 1: REPORT

CLAUDIA WATTS

29 Capstan Square, Isle of Dogs, London E14 3EU

I have to confess that being asked to consider taking on the role of President of the British Entomological and Natural History Society two years ago was a very flattering surprise but rather daunting prospect. However, I have been supported and ably assisted in the role by all the Council members and Officers of the Society, who put in such sterling voluntary work to ensure the smooth running of everything we do, and who deserve our thanks. Our publications committee have once again worked hard to produce a second edition of *Soldierflies*, coming hot on the heels of a re-print of our bestselling publication *British Hoverflies*. I would particularly like to thank Roger Hawkins, who meticulously proof-reads and corrects the texts for these books and also compiles the indexes for our journal on top of his duties as Assistant Treasurer. I would also like to give special thanks to Mike Edwards who has continued to organise and oversee the Society's ever-popular identification workshops at Dinton Pastures and now also at the Angela Marmont Centre in the Natural History Museum in London despite the increasing personal demands on his time. He steps down as Lanternist this year and his duties will be shared by two new members of Council, Marc Taylor and Sam Jones, who have been participants on many of our workshops and will be able to take them forward. Jon Cole is also coming off Council this year; he has been a useful and active member of our Outreach committee and helped out on many of our Open days and I hope will continue to work closely with us in future. Peter Chandler as Curator has been ably overseeing the continuation of the re-pinning and re-curation of our Coleoptera collection by Steven Williams, which should be completed this year. My Vice President, Glenda Orledge and the Honorary Secretary Beulah Garner have both provided enormous support to me over the past year. Sadly Beulah has had to stand down due to her increased workload, but Glenda has agreed to continue providing her support during my second year in office. My thanks and gratitude also go to Tony Prichard who as the Society's Webmaster has coped with re-formatting society notices, meeting programmes and any last-minute updates and getting them onto the site for our members to see. As has been mentioned in the Council report, we have commissioned a re-design of our website and the new format will allow more than one person to manage these tasks and spread the load, and Tony has taken the opportunity to step down once the new site goes live. As well as a very active Facebook page, the Society is embracing the digital age and now has a Twitter account with nearly 500 followers. I hope our new website will attract more people to visit us online and discover more about the British Entomological and Natural History Society and what we do. In addition to our main field meeting programme, the Society had a very well run and most enjoyable 3 day field trip to Lundy Island in July, ably organised by Glenda Orledge who put a huge amount of work into it in advance. 2014 also saw the return of our annual exhibition to Central London, where it was held in the Conway Hall. I spoke to as many who attended the event as I could, who told me that they liked the atmosphere of the location, reminding many of the old days when it was held at Chelsea Town Hall. We shall be returning to the same venue this year and I hope to see many of you there with exhibits.

This year has been an interesting one for entomology. I was delighted to attend the opening of the first Buglife reserve at Canvey Island, where I worked for the charity as a community outreach officer several years ago. There was an excellent turnout for the event and it was good to see so many children being enthralled by the insects caught in the moth traps. National Insect Week held many events across the country last summer, including one at Dinton Pastures, and garnered a lot of positive publicity for insects and entomologists. Pollinators have been in the news a lot, too, with a new National Pollinator Strategy published in November 2014 and updated earlier this month. I attended an event in October to learn about all the research that has been funded by the Insect Pollinators Initiative and the work going into discovering and addressing the pressures that are being put on pollinators in the modern world. Using our new Twitter account to highlight some of the findings gained us a lot of new followers, which is perhaps an indication of the increasing interest and popularity in pollinating insects among the general public. A new Lottery funded initiative at the Natural History Museum to recruit and train young people in the identification of various difficult or less popular taxonomic groups and then to teach them how to pass those skills on to others is one that I think all entomologists will welcome, as it is an oft-repeated concern that the next generation of entomologists are not being recruited to follow in the footsteps of the fine entomologists this country has produced over the centuries. I had the pleasure of sitting next to one of the new recruits at this year's Verrall Supper and was encouraged and heartened by her enthusiasm and energy. I look forward to the time when we will be able to invite the new trainers to give workshops for the BENHS at Dinton Pastures. I would also like to thank our two student speakers today, who are also proof that entomology is still enjoyed by the next generation; I think the future is in safe hands! With Alan Stewart, Glenda Orledge and now Simon Leather on Council, I very much hope that we can continue to work with universities and academic institutions to support and foster an interest in entomology and a wish to continue in the subject among current and future students. We are holding a students' day at Dinton Pastures on the 24th October, and again would like to invite not only students to come, but also older members who are willing to share their enthusiasm and expertise.

It was my pleasure this year to welcome three new Special Life Members who have all completed 50 years of BENHS membership: Alan Fairclough, a microlepidopterist and keen moth recorder in Northumberland; Brian Morrison, whose expertise in aquatic insects has contributed greatly to our knowledge of wetland ecology in Scotland; and Neville Smith, who registered his interest in Lepidoptera, Hymenoptera and Coleoptera back in 1965.

Is is also my sad duty to record the deaths of seven of our members: David Nash, John Roche, Brian Gardiner, Mark Middleton, the lepidopterist Nigel Potter, and Aubrey Jones, who was interested in mayflies and damselflies. It has also only just come to the attention of the Society that Michael Bleckwen, who used to be a regular attendee of the Society's Tuesday evening meetings in London, died in 2013.

David Nash was a coleopterist who joined the society in 1974 and died last March aged 72. As County recorder, he devoted many hours to digitising beetle records in Suffolk with the aim of producing a book on the beetles of Suffolk. His interest also led to numerous publications of his finds in both local publications and national journals.

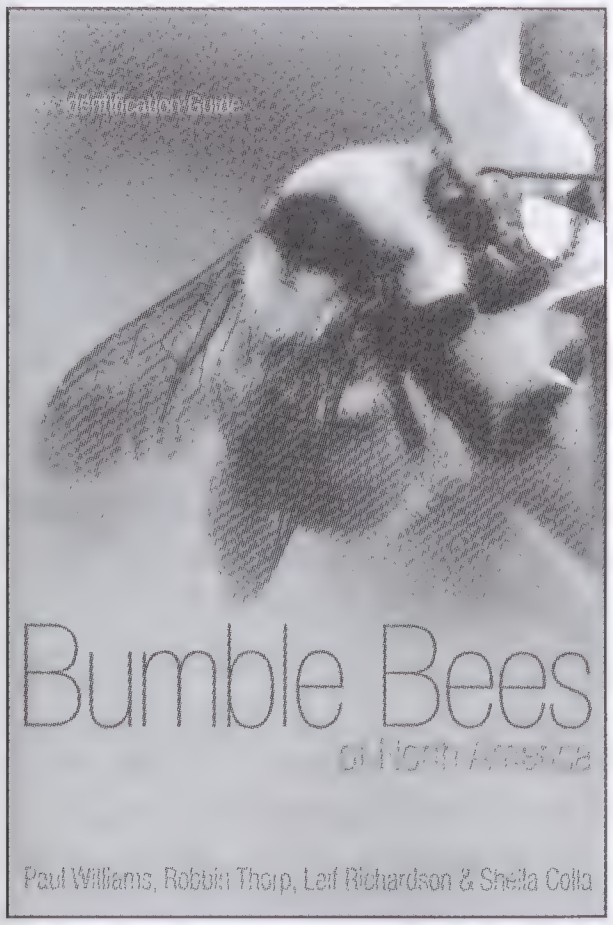
John Roche died on 7th September. A member since 1962, he was a marvellous lepidopterist and we are most grateful to his wife for donating his collection of microlepidoptera to the Society's collection at Dinton Pastures.

Brian Gardiner died last year at the age of 91. He joined the society in 1958 and worked for the Agricultural Research Council for nearly 40 years. A well-known lepidopterist, he bred thousands of butterflies and moths particularly Large Whites for study and research – and, I'm told 3,000 of these were ordered for release at the Rolling Stones Concert in Hyde Park in 1969. In addition he was the author or co-author of over 400 papers, not only on the Lepidoptera, but also a bloodsucking bug *Rhodnius prolixus*. He was for many years an associate editor for *The Journal of Research on the Lepidoptera* and also edited *The Entomologist* for the Royal Entomological Society.

Mark Middleton passed away in May after nearly 50 years as a BENHS member. As a boy he was a neighbour of Ann Robinson, wife of the co-inventor of the Robinson moth trap, who introduced him to what would be a lifelong hobby collecting and studying moths. A keen supporter of our society, he left a generous bequest in his will, which his executor and friend Tony Pickles suggested he would have liked to be used to further the training and development of those starting out in entomology. These funds will greatly support our workshop programme, continued support for the Bug Club and proposed student days and campus events.

May I ask you to stand for a minute in memory of these and all our late members.

I look forward to serving another year as President with the continuing members of Council, whose tireless work I again thank them for. I also give a warm welcome the new recruits joining us today. Thank you.



BOOK REVIEW

Bumble Bees of North America, An Identification Guide by Paul Williams, Robin Thorp, Leif Richardson and Sheila Colla. 208 pp. Princeton University Press, 2014. Hardback £16.95. ISBN 9780691152226.

Why should anyone reading an essentially North-western European Journal be concerned with the bumblebees of North America? There are several reasons, all topical, but not all strictly concerned with the bumblebees themselves.

For the bumblebees themselves, this is a very well-written book which presents and updates information from a wide range of sources in a very readable and clear way. The introduction is short, but eminently applicable to bumblebees everywhere. The authors are not afraid to be quite clear where things are not as certain as they would like, or where some cherished ideas are looking less tenable, such as foraging by males, or communication between individuals; although a little more direction of where to look for more information would have been appreciated by myself.

It is after the first 50 pages that the second set of reasons to study this book become more apparent: those connected with the popularisation of an, apparently distinctive, and certainly appealing, group of organisms. Despite the simplistic

comments of popularists and politicians everywhere, this is clearly a minefield. Trying to serve both accuracy in their identification and the current political craze for what is termed 'Citizen Science' results in well-written sections of text (taken individually) becoming a horrible mish-mash of conflicting ideas when viewed as a whole.

Not for nothing does that most venerable of aculeate researchers, Mitchener, describe the bumblebees as morphologically monotonous. Nor is it an accident, despite numerous attempts to prove otherwise, that the Linnean binomial system of nomenclature is still going strong some 300 years after Linnaeus himself. Whilst the earlier chapters valiantly struggle to provide 'easy English' names for examples, including each species account being sub-headed with these, by the key at the end all pretence has gone and scientific names stand alone. No wonder, when we are treated to such gems of 'easiness' as Northern Amber Bumble Bee for *Bombus borealis* and Variable Cuckoo Bumble Bee for *Bombus variabilis* (note the splitting of a word we normally write as one – not sure what this gains). I personally get 'word-tired' with such clumsy terminology, but perhaps I am just a reactionary old man!

This contrasts remarkably with the succinct and excellently expressed chapter on Bumblebee names and classification, with its supporting table of groups within the genus on pages 45–46. The individual species accounts are dense, but necessarily so, although clearly laid out. Anyone who faints at a scientific name will *not* go here! Those who skip the text to look at the colour pattern identification, convinced that this must be the easy way to provide a name, will be similarly dismayed. The very detailed pattern maps do little except convince one that this way lies madness, at least for many of the species; indeed Paul Williams has remarked to me on other occasions that bumblebees are like football supporters who keep changing their strips – colour patterns are a local phenomenon.

For those who get this far, the penultimate chapter, the identification keys, are a must, but here the previous well spaced layout becomes less convincing. The use of focus-stacked photos, rather than line drawings, is to be welcomed: it is both quicker to do and more realistic than line drawings.

The problem is that what these gain in describing 'reality' may be lost because of the inevitable loss of definition once the artist's interpretation, and highlighting of what they are looking at, gets taken away. Reducing line drawings to the available 'page estate' is often a problem, and with photos this problem is even more acute. The layout fails horribly in this respect, with photos requiring detailed appreciation of small structures being reproduced at sizes as low as 22mm square in some cases and never more than 25 by 35mm, often with no 'white space' being left between them, so that the eye is confused by the inevitable blending of essentially similar colours. As for the key characters – well, these just reinforce the idea of monotony, this is *not* an *easy* group of insects!

The final chapter – the Glossary – is back to the earlier levels of clarity and generally good spacing, with a more generous allocation of space for the photos – but the space allocated to these could still be larger in some cases – especially if some 'context' could be included; the beginner is unlikely to readily find the areas shown in some of the photos.

So, should anyone in North-western Europe buy this book? If they have any interest in this group of insects, their biology or how the species are told apart, including the naming of parts, they most certainly should, it is well worth the £16.95 for the general sections alone.

MIKE EDWARDS

SHORT COMMUNICATION

Is *Eremocoris podagricus* (F.) (Hemiptera: Lygaeidae) an urban insect? – Massee (1949) gives the specific advice that this seldom reported groundbug should be sought amongst the fallen leaves of hawthorn, *Crataegus* spp. (Rosaceae), on chalk soils. Massee (1952) adds that the bug can be found in situations devoid of vegetation, such as the bare ground under hawthorn. Woodroffe (1962) states more generally that the animal is found among the stones and litter under bushes in the chalk country of southern England; and Southwood & Leston (1959) adds sandy heaths as a preferendum. The consensus of opinion seems to be that this is a local insect found on the ground in dry situations.

My own recording has found it in quarries, which is consistent with the dry requirements reported for the bug; but I have also taken a single specimen in a pitfall trap in my Oxford garden, which is not (Ryan, 2013a). This last record could have been sporadic, and not representative of the insect's preferenda. So, in 2014, I decided to investigate the urban status of the animal, and found two more sites in central Oxford.

The first was the graveyard of St Giles Church (SP511069). In the leaf litter along the south wall I took a single *E. podagricus* on 14 March and another two on 17 March. The second site was University Parks. In litter under the trees along the north boundary (SP514074) six examples of the insect were taken on 30 April. I returned to both sites on 10 July and took several nymphs at each which, based upon observations of my previous cultures of the insect, I recognised as being of the species. Evidently, *E. podagricus* is breeding at these two locations.

None of the three Oxford sites could be considered 'dry', and there was no hawthorn. Clearly, urban parks and gardens is a new recorded preferendum for the bug, and I wonder how general is the insect's association with this habitat. As I have recently pondered about *Legnotus limbosus* (Geoffroy) (Hemiptera: Cydnidae) (Ryan, 2013b), given the warmer conditions of urban areas, compared with the surrounding countryside, does the range of *E. podagricus* extend further north than is currently believed? – R. P. RYAN, 38 St John Street, Oxford, OX1 2LH (email: *RobRyanBugs@gmail.com*).

REFERENCES

Massee, A. M. 1949. Notes on mounting and collecting the Hemiptera-Heteroptera. *Entomologist's Monthly Magazine* **85**: 152–156.

Massee, A. M. 1952. The three British species of the genus *Eremocoris* (Hem., Lygaeidae) recorded in Kent. *Entomologist's Monthly Magazine* **88**: 63.

Ryan, R. P. 2013a. Some records of *Eremocoris podagricus* (Fabricius) (Hemiptera – Lygaeidae). *Entomologist's Monthly Magazine* **149**: 136–137.

Ryan, R. P. 2013b. *Legnotus limbosus* (Geoffroy) (Hemiptera: Cydnidae) in my garden. *British Journal of Entomology and Natural History* **26**: 95–97.

Southwood, T. R. E. & Leston, D. 1959. *The land and water bugs of the British Isles*, Frederick Warne & Co. Ltd., London.

Woodroffe, G. E. 1962. The identity of the British *Eremocoris* Fieber (Hem., Lygaeidae). *Entomologist's Monthly Magazine* **98**: 262–263.

Linnean Society H. H. Bloomer Award 2015

The Society is pleased to report that our member, Robert Heckford, has been awarded this year's H. H. Bloomer Medal by the Linnean Society of London. This prestigious Award was established in 1963 by the Society's Council from a legacy by the late Harry Howard Bloomer FLS, as an award to an amateur naturalist who has made an important contribution to biological knowledge. Bob is a well known entomologist, with a particular interest in the biology of the UK's smaller moths and is a regular exhibitor at the Society's annual exhibition. He is a co-author of the recent *Checklist of the Lepidoptera of the British Isles* (Agassiz, Beavan & Heckford, 2013) and co-author of *A provisional list of the moths of Lundy, Devon* published in the Society's Journal last year (Beavan & Heckford, 2014).

References

Agassiz, D. J. L., Beavan, S. D. & Heckford, R. J. 2013. *Checklist of the Lepidoptera of the British Isles*. 206 pp. Handbooks for the Identification of British Insects. Volume 12 Part 6 published for the Royal Entomological Society by the Field Studies Council.

Beavan, S. D. & Heckford, R. J. 2014. A provisional checklist of the moths of Lundy, Devon. *British Journal of Entomology and natural History* **27**: 45–62.

Ento '15 – Insect Ecosystem Services

Under the strapline 'Pollination, pest control, decomposition and beauty, what insects and entomology have given us', the Royal Entomological Society will be holding its International Symposium and National Meeting at Trinity College Dublin, Ireland on 2–4 September 2015. This will be the first ever conference held by the Society in Ireland. Proposed Symposium Sessions include Pollination (2 sessions), Multiple Ecosystem Services, Decomposition, Plant-Insect interactions, Aquatic Ecology, Invasive species, Insects as Medical Models, Biocontrol and Conservation.

Guest speakers are Jan Bengtsson (Swedish University of Agricultural Sciences, Uppsala); Sarah Beynon (Dr Beynon's Bug Farm Ltd, UK); Thomas Bolger (University College Dublin, Ireland); Jerry Cross (East Malling Research, UK); Dave Goulson (University of Sussex, UK); Alexandra-Maria Klein (University of Freiburg, Germany); Simon Leather (Harper Adams University, UK); Craig Macadam (Buglife, UK); Sarina Macfadyen (CSIRO Ecosystems Sciences, Australia); Lynn Dicks (University of Cambridge, UK); Charles Midega (International Centre for Insect Physiology and Ecology (ICIPE), Kenya) and Michael D. Ulyshen (USDA Forest Service, USA).

More information, registration, abstract and booking forms are available on www.royensoc.co.uk.

Aphid Hunter's blog

For those of you interested in UK aphids and tabanid flies (a curious combination) you might wish to visit the website run by Bob Dransfield and Bob Brightwell at *influentialpoints.com*. Both former tsetse fly researchers, now based back in the UK, have set up a blog on UK aphids and medical insects including tabanids. The aphid section has brilliant close-up photographs of 65 genera representing >200 species. The latest addition is the black stem aphid, *Cinara confinis* (Koch), a well established fir species, with a photograph showing it hosting what is expected to be a parasitoid species new to Britain.

Invertebrate Link (JCCBI) Symposium

To be held at the Linnean Society of London, Burlington House, Piccadilly, London on 23 September 2015

In association with the Linnean Society's Taxonomy & Systematics Committee

Formed in 1968 as the Joint Committee for the Conservation of British Insects, Invertebrate Link (JCCBI) brings together organisations concerned with the conservation and study of invertebrates in the UK. It provides a forum for the sharing of information and views amongst its member organisations, which include leading conservation charities, statutory bodies, entomological societies and specialist groups. Over the years, Invertebrate Link has produced various well-regarded codes of practice, guidance documents and policy statements, and has organised conferences highlighting its concerns, many of which are shared by the Linnean Society's Taxonomy & Systematics Committee. Speakers at this Symposium, which marks Invertebrate Link's 100th meeting, will address a range of such themes, including recruitment of the next generation of invertebrate specialists and biological recorders, and the importance of specimen collections, best practice in site surveys, and co-operation towards shared goals.

Programme details to be confirmed.

Those wishing to attend should register via the Linnean Society website (http://www.linnean.org/Meetings-and-Events/Events). It is anticipated that the Symposium will commence at 11am, and a nominal fee of £10 per delegate will be charged to cover lunch and tea/coffee.

Please also note that, the following day (24 September), the Linnean Society's Taxonomy & Systematics Committee is hosting a meeting organised by The Systematics Association:

The Joy of Discovering the Natural World

The sheer excitement and importance of discovering and describing the natural world is often overlooked at a time of tremendous environmental uncertainty. This one-day meeting will bring together a number of UK scientists committed to describing new species to tell the stories that lie behind their discoveries. Each talk will give an overview of the new species, explain how they were discovered (field work, existing specimens, morphology, molecular data, serendipity) and discuss the significance and excitement of their work.

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Cover photograph: A Black Silverhorn caddisfly *Mystacides azurea* (L.) (Leptoceridae), Gillingham, Dorset, 27.vi.2015. Photo: Peter Barnard.

NOTE: The Editor invites submission of photographs for reproduction on the front covers of the journal. The subject matter is open, with an emphasis on aesthetic value rather than scientific novelty. Submissions should be in the form of colour or black and white digital images (jpg or tiff format) with a minimum resolution of 1275 pixels (i.e. 4.25 inches @ 300dpi).

ESSIGELLA CALIFORNICA (APHIDOIDEA: APHIDIDAE), A PINE-FEEDING APHID NEW TO BRITAIN

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ABSTRACT

The aphid *Essigella californica* (Essig) is reported new to Britain following its discovery in November 2010, feeding on Scots Pine *Pinus sylvestris* and Bhutan Pine *Pinus wallichiana* at the Royal Botanic Gardens at Kew in London, and subsequent finds on Montezuma Pine *Pinus montezumae* in Kent.

INTRODUCTION

A small number of specimens of *Essigella californica* (Essig), the Monterey pine aphid, were found on samples of *Pinus* branches submitted to the Food and Environment Research Agency (Fera) by the Plant Health and Seeds Inspectorate (PHSI) for examination in November 2010 (Plate 9, Fig. 1). The branches originated from potted Scots Pine *Pinus sylvestris* L. and Bhutan Pine *Pinus wallichiana* Jackson grown outdoors at the Royal Botanic Gardens at Kew, which had been obtained four or five years previously for a temporary exhibition; the exact origin of the trees is unknown. Live viviparous apterae and a single nymphal viviparous alate were examined and identified by the first author. The potted *P. sylvestris* also harboured a large infestation of Smooth Pine Scale *Leucaspis pini* (Hartig), as reported by Malumphy & Redstone (2011) which was later destroyed.

In July 2012, the second and third authors found a small population of *E. californica* on Montezuma Pine *Pinus montezumae* Lamb. at Bedgebury National Pinetum, Kent. Upon re-sampling in September 2012 and August 2013, a small number of apterous viviparous specimens were sent to the Food and Environmental Research Agency for slide mounting and confirmation.

In 2013 Rothamstead Research identified a single alate *E. californica,* which was caught in the Whittle suction trap near Chelmsford, Essex on 03.xi.2009 (Mark Taylor, pers. comm.).

IDENTIFICATION

Essigella (Lachninae: Eulachnini) is a Nearctic pine feeding genus with 14 described species. They are all elongate spindle-shaped and have 5-segmented antennae and bifurcate tarsal claws which distinguishes them from the morphologically similar Palaearctic genus *Eulachnus*.

Thus far *E. californica* is the only species in the genus to have been recorded outside North America. Its viviparous apterae are 1.4–2.3mm long and have a grey-green thorax and a lime green abdomen, with or without brown dorsal spots. The legs are variably pigmented, often mainly pale but with the tibiae darker. The alatae have 2–4 secondary rhinaria on the third antennal segment (Blackman & Eastop, 1994). In Britain they could most easily be confused with *Eulachnus agilis* (Kaltenbach) which is common on *P. sylvestris*. *Essigella californica* move quickly when disturbed and are often overlooked, hence their biology is little known.

Essigella californica can be separated from other *Pinus* feeding lachnids known to occur in Britain using Blackman and Eastop (1994). Sorenson (1994) revised *Essigella*, synonymising many of the species described by Hottes in the 1950s.

DNA barcoding was performed on a single specimen from the Kent population (designation ENTOBAR1978), together with specimens of *E. californica* from a New Zealand population provided by Dr Eckehard Brockerhoff (Scion, New Zealand) on *Pinus radiata* D.Don (designation ENTOBAR1977, comprised of a pool of three adult specimens). DNA was extracted using a DNAeasy Blood and Tissue kit (QIAGEN, Manchester, UK) following the manufacturer's protocol and partial COI gene sequences were amplified using the primers Lep-F1 and Lep-R1 (Hebert *et al.*, 2004). Polymerase chain reaction products were purified using a QIAquick PCR purification kit (QIAGEN), cloned using the pGEM®-T Easy Vector System (Promega, Southampton, UK) and two randomly selected clones sequenced on both strands.

Sequence reads were assembled, polymorphic sites identified (one in ENTOBAR1977 and two in ENTOBAR1978) and the sequences submitted to the National Center for Biotechnology Information, Bethesda, USA (Accession numbers KM888107 and KM888108). The partial COI gene sequences from the two populations showed 99.5% sequence similarity due to the presence of the polymorphic sites. The *E. californica* sample from Kent showed a 100% sequence similarity to the Barcode of Life database for this species.

Behaviour and ecology

Essigella californica was found in Bedgebury National Pinetum, Kent on 28.vii.2012 on two mature *P. montezumae* trees. None was found on other conifer species in the vicinity. Observations were subsequently made on the same trees in September 2012, July and August 2013, and February 2014. In the latter two years hand searching was supplemented with beating. Searching was time consuming and had to be done very carefully to avoid disturbing the aphids, but it provided additional information about the behaviour and ecology of the species.

The aphids either fed singly or in small groups spaced out along the needle (Plate 9, Fig. 1). They were apparently in competition for this resource with abundant *Eulachnus rileyi* (Williams). Both species favoured one year old and senescent needles, which are rich in translocated nutrients (Katerere, 1984). It was observed that, if disturbed, *E. californica* became active and evasive, usually moving to the base of the needles as described by Carver & Kent (2000) and Kimber, Glatz, & Shaw (2013). Exactly the same behaviour has been described for *Eu. rileyi* by Baker & Broad (2009). In Kent, *Eu. rileyi* was sometimes attended by *Myrmica* ants (Plate 9, Fig. 2). We have not observed ants attending *Essigella*, but Sorensen (1994) recorded ants attending *E. californica* when they were aggregated near the base of needles. Wharton & Kriticos (2004) suggest that *E. californica* is not able to compete particularly well with other *Essigella* or *Lachnus* aphid species.

We did not observe any predation of *Essigella*, although we recorded various potential predators such as the coccinellid *Exochomus quadripustulatus* (L.) on the affected trees. One parasitized mummified aphid (unfortunately empty) was found attached to a needle (Plate 9, Fig. 3). The pale legs suggest it was either *E. californica* or *Eu. brevipilosus* Börner, but not *Eu. rileyi* which has dark legs. The parasite was present, pupating below the mummy, indicating that it was a *Praon* species, specifically *Praon bicolor* Mackauer (Baker & Broad, 2009).

Essigella californica has a sexual reproductive stage, but this has only been observed at high altitudes in North America. In Australia, no sexual forms have been

found and reproduction is entirely parthenogenetic. We were unable to find any *E. californica* viviparae by searching or beating the Montezuma Pine in winter in February. We did find a small *Eulachnus*/*Essigella* nymph, but were unable to rear it to the adult stage for identification.

Discussion

Essigella californica is native to western North America, where it occurs from southern British Columbia and Alberta south to Mexico and east to Nebraska. It has a wide host range amongst the Pinaceae and has been recorded from 29 *Pinus* species. It is most commonly reported from Monterey pine. There are also records of *E. californica* feeding on Douglas-fir (*Pseudotsuga menziesii* (Mirbel)) (Sorensen, 1994). It has been introduced into Australia, New Zealand, southern Brazil, Chile and Argentina, and is now well established throughout the pine growing areas of these countries. The first European record was in France in 1990, and it has since been reported from Spain, Madeira, Italy and Malta (Wharton & Kriticos, 2004). The presence of *E. californica* populations in France suggests that the Kent pines could have become colonised through natural dispersal of winged individuals, especially if dispersal was assisted by southerly or south-easterly winds. The first find at the Royal Botanic Gardens at Kew was more likely the result of an accidental importation.

Forest Research undertook a pest risk assessment to determine the probability of *E. californica* establishing in the UK and the amount of damage it might cause (Wood, 2014). The assessment determined that the aphid could colonise Scots Pine (*P. sylvestris*) and Corsican Pine (*Pinus nigra ssp. laricio* Maire) in all areas of the UK where these species are grown, and other pine species where they occur.

Essigella californica is not considered a significant economic pest in its native habitat in North America, or in New Zealand or South America. In Australia, however, it is considered an economically important pest as it causes extensive defoliation in commercial *P. radiata* plantations, particularly when the trees are under stress due to drought (Eyles *et al.*, 2011). In France, *E. californica* has been associated with localised needle yellowing on *P. radiata*, which might sometimes affect a whole branch, but it is not currently considered an economically important pest (Turpeau & Remaudière, 1990).

Acknowledgements

This work was partially funded by Defra Plant Health Policy. The authors would like to thank Jon Martin for examining a slide-mounted specimen from the Kew population, Paul Brown (Natural History Museum, London) for providing the Food & Environmental Research Agency with reference slides, and Eckehard Brockerhoff (Scion, New Zealand) for providing specimens for molecular barcoding.

Reference specimens have been deposited in the Fera Invertebrate Reference Collection and the collections of Natural History Museum, London.

References

Baker, E. A. & Broad, G. R. 2009. Five aphid parasitoids (Hymenoptera: Braconidae: Aphidiinae) new to Britain. *British Journal of Entomology and Natural History* **22**: 255–263.

Blackman, R. L. & Eastop, V. 1994. *Aphids on the World's Trees. An Identification and Information Guide*. CAB International, Wallingford, UK. Updated at: http://www.aphidsonworldsplants.info

Carver, M. & Kent, D. S. 2000. *Essigella californica* (Essig) and *Eulachnus thunbergii* Wilson (Hemiptera: Aphididae: Lachninae) on *Pinus* in south-eastern Australia. *Australian Journal of Entomology* **39**: 62–69.

Eyles, A., Robinson, A. P., Smith, D., Carnegie, A. Smith, I., Stone, C. & Mohammed, C. 2011. Quantifying stem growth loss at the tree-level in a *Pinus radiata* plantation to repeated attack by the aphid, *Essigella californica*. *Forest Ecology and Management* **261**: 120–127.

Hebert, P. D. N., Penton, E. H., Burns, J. M., Janzen, D. H. & Hallwachs, W. 2004. Ten species in one: DNA barcoding reveals cryptic species in the neotropical skipper butterfly *Astraptes fulgerator*. *Proceedings of the National Academy of Sciences of the United States of America* **101**: 14812–14817.

Katerere, Y. 1984. Biology and population dynamics of the pine needle aphid, *Eulachnus rileyi* (Williams) in Zimbabwe. *South African Forestry Journal* **129**: 40–49.

Kimber, W., Glatz, R. & Shaw, S. 2013. Introduction of the wasp *Diaeretus essigellae*, for biological control of Monterey Pine Aphid *Essigella californica*, in Australia. Final Report. Forest & Wood Products Australia.

Malumphy, C. & Redstone, S. 2011. First incursion of smooth pine scale *Leucaspis pini* (Hartig) (Hem., Diaspididae) in Britain, with a review of the status of *Leucaspis* in Britain. *Entomologist's Monthly Magazine* **147**: 69–75.

Sorensen, J. T. 1994. A revision of the aphid genus *Essigella* (Homoptera: Aphididae: Lachninae): Its ecological associations with, and evolution on, Pinaceae hosts. *Pan-Pacific Entomologist* **70**: 1–102.

Turpeau, B. & Remaudière, G. 1990. Découverte en France d'un puceron des pins américains du genre *Essigella*. *Comptes Rendus de l'Academie Agricole de France* **76**: 131–132.

Wharton, T. N. & Kriticos, D. J. 2004. The fundamental and realized niche of the Monterey Pine aphid, *Essigella californica* (Essig) (Hemiptera: Aphididae): implications for managing softwood plantations in Australia. *Diversity and Distributions* **10**: 253–262.

Wood, N. 2014. Rapid assessment of the need for a detailed Pest Risk Analysis for Monterey pine aphid, *Essigella californica*. www.fera.defra.gov.uk/plants/plantHealth/pestsDiseases/documents/essigellaCalifornicaPRA.pdf

SHORT COMMUNICATION

***Stiroma bicarinatus* (Herrich-Schäffer) (Hemiptera: Delphacidae) refound in Surrey**. – On 24.vi.2015 (and again on 17.vii.) I swept several males and females of the plant hopper *Stiroma bicarinata* from a herb-rich damp grassland around the 'village' pond on Coldharbour Common, Surrey (TQ149538). The area is on a slope with seepages, and supports a very rich insect fauna with other interesting bug species including *Adelphocoris ticinensis* (Meyer-Dür) (Hem., Miridae) The only previous Surrey record is from Shere by J. Edwards in the late 19th Century. The flight period tallies well with Ossiannilson (1978), who gives 'low vegetation in light leafy woods' as main habitat. The Coldharbour site is surrounded by woodland and has scattered sallow bushes. Nickel (2003) reports that the species is often found in tussocks of *Deschampsia flexuosa*, but also on a wide range of grasses including *Holcus mollis*, *Dactylis glomerata, Elymus repens* and *Arrhenatherum elatius*. – JONTY DENTON, 31 Thorn Lane, Four Marks, Hants, GU34 5BX.

REFERENCES

Nickel, H. 2003. *The leafhoppers and planthoppers of Germany (Hemiptera, Auchenorrhyncha). Patterns and strategies in a highly diverse group of phytophagous insects*. Pensoft.

Ossiannilsson, F. 1978. The Auchenorrhyncha (Homoptera) of Fennoscandia and Denmark. Part 1. Introduction, infraorder Fulgoromorpha. *Fauna Entomologica Scandinavica*, 7 (1).

JAPANANUS HYALINUS (HEMIPTERA: CICADELLIDAE) – GENUS AND SPECIES NEW TO BRITAIN

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ABSTRACT

The Japanese Maple Leafhopper *Japananus hyalinus* (Osborn) is reported as new to Britain from Cambridge in eastern England (VC29). Specimens were photographed on three occasions in the vicinity of a preferred food plant, *Acer palmatum,* between August and October 2014. Further sightings in 2015 indicate that the species has bred successfully locally. Somewhat unusually, the discovery of a new British species was made via the circulation of the first photograph on social media. The species is native to Japan, but has been widely transported in cultivated *Acer* stocks and has been spreading across mainland Europe since the 1960s. Its arrival in the UK was therefore not unexpected.

INTRODUCTION

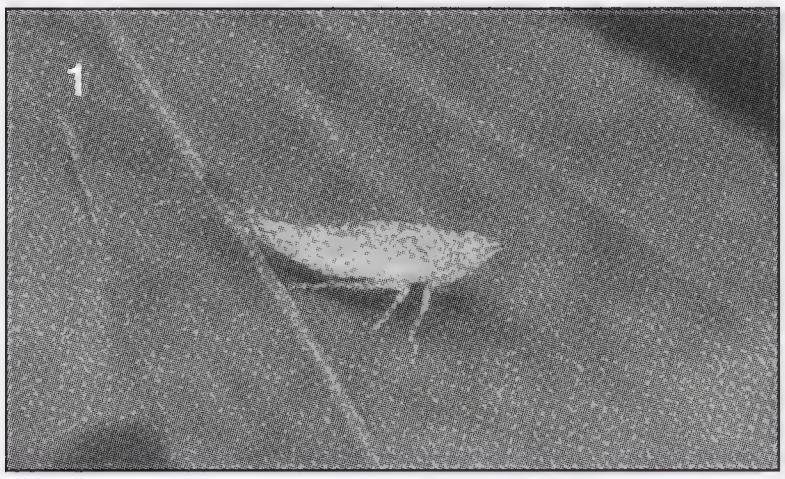
On 28th August 2014, a relatively large and distinctively marked leafhopper was photographed on a Michaelmas daisy (*Aster amellus*) plant in a garden in Cambridge (TL4658). Consulting the standard literature on Auchenorrhyncha in Britain (Le Quesne, 1965, 1969) failed to produce a positive identification. This was only provided when a photo posted on Flickr caught the attention of European Auchenorrhyncha expert Dr Herbert Nickel of the University of Göttingen, who recognised it as *Japananus hyalinus* (Osborn) and suggested that it was probably new to Britain (Figs 1 & 2; Plate 9, Fig. 4). Dr Alan Stewart of the UK Auchenorrhyncha Recording Scheme confirmed this as the first British record in the wild. Tuffen *et al.* (2014) do, however, report that two adults were intercepted in 1999 on *Acer palmatum* stock imported from South Korea. Subsequent enquiries revealed that this was at a nursery in Dorset (C. Malumphy, *in litt.*).

Further photographs were obtained on 22nd September and 19th October 2014 in the same area of the garden, which is underneath a long-established *A. palmatum* tree. It is not possible to determine whether these photographs show the same or different individuals.

In 2015, on 8th and 9th August, nymphs of the species were photographed on the same *A. palmatum* tree in Cambridge (Fig. 1) and later on the 9th a newly-emerged adult was observed. This confirms that the species has successfully managed to survive one winter in England and that it may, in time, become part of our resident fauna. The extent of the leafhopper's distribution in Cambridge has yet to be explored.

DESCRIPTION

The following description is taken from Biedermann & Niedringhaus (2009) and personal observation. The females are 5.2–5.4 mm long, the males smaller at 4.2–4.5 mm. The head is greenish yellow and the vertex strongly pointed. The forewings are almost transparent apart from the reddish veins, the males being less strongly marked than the females. In the resting position three prominent narrow beaded bands of purplish-brown colour run more or less straight across the wings, incorporating some portions of the veins, and some other cross-veins are also



Figs. 1–2. Nymph and adult of *Japananus hyalinus*, Cambridge 2014–15. Photos: K. Edkins.

thickened (Fig. 2; Plate 9, Fig. 4). The scutellum is yellow and usually has thin dark markings resembling a frowning face. Osborn (1900) gives full descriptions; Xing, Dai & Li (2008) and Biedermann & Niedringhaus (2009) give figures of the aedeagus.

The nymphs have a highly distinctive apearance, being sharply pointed at both the head end and the tip of the abdomen (Fig. 1). The overall body colour is pale yellow with darker markings, with a small dark spot on the vertex, and posterior abdominal segment and developing genitalia pale brown.

Ecology and distribution

In its Asian native range the host plants are *Acer japonicum* and *A. palmatum*. In other places it readily adapts to locally available *Acer* species, a fact which no doubt assists its rapid spread. In Europe the main food plant is field maple (*A. campestre*), and it has been recorded on Norway maple (*A. platanoides*), sycamore (*A. pseudoplatanus*), and other *Acer* species (Nickel, 2003). There is normally one generation per year (two in Italy), with the eggs over-wintering. The eggs are inserted into the nodes of young branches, making them very difficult to detect in dormant planting stock.

The species was first described as *Platymetopius hyalinus* by Osborn (1900) from specimens taken in Washington, D.C., with the stated suspicion that it was an introduced species in the USA. It was independently described, as *Platymetopius cinctus*, by Matsumura (1914) from Hokkaido, Honshu and Kyushu. Oman (1931) pointed out the synonymy of these two names, and at about the same time Ball (1931) designated *P. hyalinus* as the type species of a new genus *Japananus* Ball. Zahniser & Dietrich (2013) include the genus *Japananus* in the tribe Opsiini; it was formerly included in the Scaphytopiini.

Japananus hyalinus first reached Europe around 1961 and its subsequent spread on the European mainland is summarised by Walczak, Musik & Mokrzycka (2012). It has also been found in Australia (Fletcher & Knight, 1998). A Rapid Pest Risk Analysis by The Food & Environment Research Agency (Tuffen *et al.*, 2014) reported that the species has not been recorded as a virus or phytoplasma vector, although no specific studies have been done to assess its potential as a vector. The conclusion was that its impacts are likely to be small and that attempts to eradicate it were anyway unlikely to be unsuccessful.

Acknowledgements

The author wishes to thank Dr Herbert Nickel for the original identification, Dr Chris Malumphy (FERA) for correspondence on the earlier interception and Dr Alan Stewart for encouragement and advice on submitting this article.

References

Ball, E. D. 1931. Some new North American genera and species in the group formerly called *Platymetopius* (Rhynchota, Homoptera). *Canadian Entomologist* **63**: 216–222.

Biedermann, R. & Niedringhaus, R. 2009. *The Plant- and Leafhoppers of Germany – Identification key to all species*. Wissenschaftlich Akademischer Buchvertrieb – Fründ, Scheeßel, Germany.

Fletcher, M. J. & Knight, W. J. 1998. New Australian Records for Exotic Leafhoppers. *Abstracts of the 29th Annual General Meeting and Scientific Conference of the Australian Entomological Society* 1998: 41.

Le Quesne, W. J. 1965. Hemiptera (Cicadomorpha) (excluding Deltocephalinae and Typhlocybinae). *Handbooks for the Identification of British Insects*. Royal Entomological Society Volume II. Part 2(a).

Le Quesne, W. J. 1969. Hemiptera (Cicadomorpha – Deltocephalinae). *Handbooks for the Identification of British Insects*. Royal Entomological Society Volume II Part 2(b).

Matsumura, S. 1914. Die Jassinen und einige neue Acocephalinen Japans. *Journal of the College of Agriculture, Tohoku Imperial University, Sapporo* **5**: 165–240.

Nickel, H. 2003. *The leafhoppers and planthoppers of Germany (Hemiptera, Auchenorrhyncha): patterns and strategies in a highly diverse group of phytophagous insects*. Series Faunistica 28. Pensoft Publishers, Sofia-Moscow.

Oman, P. W. 1931. New Jassinae, with notes on other species. *Journal of the Washington Academy of Sciences* **21**: 430–436.

Osborn, H. 1900. A neglected *Platymetopius*. *Entomological News* **11**: 501–502.

Tuffen, T., Baker, R., Eyre, D., Korycinska, H. & Smith, R. 2014. *Rapid Pest Risk Analysis (PRA) for Japananus hyalinus*. Food & Environment Research Agency. https://secure.fera.defra.gov.uk/phiw/riskRegister/plant-health/documents/japanusHyalinus.pdf

Walczak, M., Musik, K. & Mokrzycka, A. 2012. *Japananus hyalinus* (Osborn, 1900) – a new leafhopper for Polish fauna (Hemiptera: Cicadomorpha). *Wiadomosci Entomologiczne* **31**: 242–250.

Xing, J., Dai, R. & Li, Z. 2008. A taxonomic study on the genus *Japananus* Ball (Hemiptera, Cicadellidae, Deltocephalinae), with description of one new species from China. *ZooKeys* **3**: 23–28.

Zahniser, J. N. & Dietrich, C. 2013. A review of the tribes of Deltocephalinae (Hemiptera: Auchenorrhyncha: Cicadellidae). *European Journal of Taxonomy* **45**: 1–211.

SHORT COMMUNICATIONS

Nocturnal activity of *Coleophora galbulipennella* Zeller (Lep.: Coleophoridae) at Dungeness, Kent. – On 2.vii.2015 I arrived at Kerton Road, Dungeness at 03.00h to begin my day's fieldwork, to find Colin Hart packing away his light-trap after a successful night's Lepidoptera recording. Species of note at his trap included Silver Barred *Deltote bankiana* (F.) and Rest-Harrow *Aplasta ononaria* (Fuessly). In conversation over a nice cup of tea I offered to show Colin the Dungeness micro-speciality *Coleophora galbulipennella* Zeller which I knew was present in large number literally yards from us, despite it being completely dark. Lying down on the shingle, by the roadside, using a torch we soon found lots of mature rosettes of Nottingham Catchfly *Silene nutans*, the moth's hostpant, showing typical whitening of the leaves where browsing larvae in their portable cases had fed earlier (Plate 10, Fig. 1). Tony soon espied several adult coleophorids actively walking over the hostplants and these were assumed to be *C. galbulipennella*. The moth is truly nocturnal as a return visit at 5.00h in early sunlight failed to reveal the presence of a

single adult moth in the immediate vicinity. The weather conditions had changed little. It is possible the moths had sought safety by resting under the abaxial surface of the leaves which lie fairly close to the ground, as these were not inspected, though it is equally plausible they could have been resting on non hostplants nearby. – JOHN BADMIN, Coppice Place, Selling, Kent ME13 9RP.

A new record of *Aradus aterrimus* (Fieber) (Hemiptera: Aradidae) in Kent. – On 7.iv.2015 whilst walking through Bysing Wood near Faversham (TQ9962) I noticed a flatbug sitting on the cut surface of a chestnut coppice stool. I do not normally take flatbugs, but as this one seemed a little unusual, I collected it for identification. Using pictures on the British Bugs website and the key in Land and Water Bugs of the British Isles (Southwood & Leston, 1959), I identified the specimen as *Aradus aterrimus*. A quick look in the data base of the Kent & Medway Biological Records Centre showed that there are relatively few records of this species from Kent and that it has been classified in the Kent Red Data Book (Waite, 2000) as Vulnerable in Kent, and Rare nationally (Kirby, 1992).

I took a quick photograph of the specimen and sent it to Kent's County Recorder for Heteroptera, Jonathan Barnard, for a second opinion, who agreed with my determination. To be on the safe side we sent the photo to Tristan Bantock and Joe Botting for their opinion, and the possibility of it being a closely related species, *A. angularis* (Sahlberg) could not be ruled out. The specimen was subsequently sent to Tristan for checking against reference material at the Natural History Museum and confirmed as a male *A. aterrimus*.

This represents the first British record since a single specimen was taken in West Sussex in 1977 (Jim Flanagan, pers comm) and the first for Kent since Massee found it in seven localities in the period 1934 to 1961 (Massee, 1962).

Aradus aterrimus is a woodland species mainly associated with Sweet Chestnut *Castanea sativa* (Mill.) coppice, where it is thought to feed on fungal growth amongst wood chippings. With the recent increase in the number of woodlands being managed for wood fuel and other wood products it is possible that this species will benefit and subsequently be found elsewhere. TONY WITTS, Kent & Medway Biological Records Centre, Brogdale Farm, Faversham, Kent ME13 8XZ, *Tony.witts@kmbrc.org.uk*

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My thanks go to Tristan Bantock for confirming the identity of the specimen and to Jim Flanagan for putting the record in the national context.

REFERENCES

Kirby, P. 1992. *A review of the scarce and threatened Hemiptera of Great Britain*. JNCC, Peterborough.

Massee, A. M. 1962. Hemiptera-Heteroptera of Kent II. *Proceedings of the South London Entomological and Natural History Society* **1962**: 123–183.

Southwood, T. R. E. & Leston, D. 1959. *Land and water bugs of the British Isles*. Warne, London.

Waite, A. (ed.) 2000. *The Kent Red Data Book: a provisional guide to the rare and threatened flora and fauna of Kent*. Kent County Council.

Records and observations of Black Oil-beetle *Meloe proscarabaeus* L. (Col.: Meloidae) in Kent. – On 9.iv.2014 I found a female *Meloe proscarabaeus* while walking along a footpath on the top of a ditch bank at Reculver TR2168 along the north Kent coast (Plate 10, Fig. 3). With the help of Sue Healey, Irene Robson and Sally Jennings, a total of nine females and one male were found along 30m of the path. One of the females was attempting to burrow into the soil and another was eating grass leaves. The photographs taken were used to confirm the species (Walters, 2011). On 30.iv.2015 SH and IR revisited the same site at Reculver and found one male and one female (dead-squashed) *M. proscarabaeus*.

In June 2014 I read that a *M. proscarabaeus* had been found on 23.v.2014 at the RSPB reserve Great Bells Farm on Sheppey TQ9867 (RSPB, 2014). One male beetle was found by Jane Sears of the RSPB Ecology Dept. accompanied by Viv Booth (Ecology Dept.), Julian Nash (Site Manager North Kent Marshes) and Marc Fletcher (Regional Reserves Manager). The beetle was found in short sward in a grazing field, adjacent to a ditch and a non-grazed ditch bank with rougher vegetation.

In April 2015 I contacted Tony Witts (Information and Projects Manager at Kent and Medway Biological Records Centre (KMBRC)) and was informed that he had found a *M. proscarabaeus* in Bysing Wood TQ9962 near Faversham, Kent on 30.iii.2015. The beetle was found in coppiced woodland (Oak over Sweet Chestnut) and along the path edges were mining bees. It is possible that these were the hosts. *Andrena wilkella* Kirby and *A. flavipes* Panzer have been recorded at this site.

Tony also provided me with other Kent records of *M. proscarabaeus* held at the KMBRC and, at the suggestion of John Badmin, Darren Mann (Oxford University Museum of Natural History) provided me with further records (Table 1).

The recent sightings of *M. proscarabaeus* from Great Bells, Reculver, Oare Marshes and Cleve Marshes, suggest that this species should be looked for elsewhere along the north Kent marshes from Gravesend to Whitstable. Flower-rich ditch banks, with suitable nectar sources for host bees and bare soil patches that provide the beetle with sites for egg laying, should be searched from April to June. Similar sites on Romney Marsh could also hold *M. proscarabaeus*. However the above records also show that *M. proscarabaeus* is not confined to this habitat in Kent and may also be found in open woodland sites and other flower-rich grassland sites. Nationally, this species is found in lowland areas throughout Britain, but is rarer in the North. The South West of England and South Wales are strongholds for this species (Buglife, 2012).

Lytta vesicatoria (L.) is the only other species of oil beetle still found in Kent with recent records, to at least 2012, from Ranscombe Farm. However there are historical records for seven other oil beetle species in Kent; *M. autumnalis* Olivier, *M. brevicollis* Panzer, *M, cicatricosus* Leach, *M. mediterraneus* G. Müller, *M. rugosus* Marsham, *M. variegatus* Donovan, and *M. violaceus* Marsham – all now assumed extinct in Kent.

All species of oil beetle in Britain have been identified as priorities for conservation action through the UK Biodiversity Action Plan. The species recovery programme is managed by a partnership between Buglife, the National Trust and Oxford University Museum of Natural History. Recent conservation management of coastal grassland sites in the north Kent marshes by the RSPB and Kent Wildlife Trust should assist the recovery of *M. proscarabaeus*. Records of oil beetles should be sent to Buglife and in addition Tony Witts of Kent & Medway Biological Records Centre would welcome further records from Kent.

I thank Sue Healey and Jane Sears for permission to use their photographs and Julian Nash for providing the details of the RSPB record from Sheppey. I also thank

Table 1. Records of Black Oil-beetle *Meloe proscarabaeus* in Kent.

Grid Ref.	Location	Date	Recorder
TR0164	Oare Marshes	16.vi.2013	Gould, M.
TR0619	Dungeness (RSPB)	20.iii.2011	unknown
TQ7743	Staplehurst	22.iv.2009	Traves, R
TQ9329	Appledore	iv.2009	Adams, D.
TQ9329	Appledore	16.iv.2009	Watts, T. & Philp, E. G.
TR06M	Cleve Marshes, Seasalter	11.iv.2002	Booth, R.
TQ75Z	Detling	28.iii.1964	Philp, E. G.
TQ75	East Malling	iv.1963	Massee, A. M
TQ65	Wrotham	28iv.1957	Gould, A. W.
TQ65	Wrotham Downs	19.iv.1957	Gould, A. W.
TR36	Pegwell Bay	15.vi.1949	Daltry, H. W.
TR36	Pegwell Bay	10.vi.1949	Daltry, H. W.
TQ75	Aylesford	18.iv.1948	Massee, A. M.
TQ75	Aylesford	10.v.1947	Massee, A. M.
TQ75	East Malling	8.vi.1945	Massee, A. M
TQ67	Gravesend	7.v.1942	Southwood, D.
TQ75	East Malling	22.iv.1942	Massee, A. M
TR36	Pegwell Bay	10.v.1934	Daltry, H. W.
TR36	Shell Ness, Sandwich Bay	9.v.1934	Daltry, H. W.
TQ55	Sevenoaks	15.5.v.1932	Saunders, C. J.
TR3563	Pegwell Bay	14.iv.1903	Donisthorpe, H. St. J. K.
TQ97	Isle of Sheppey	19 – –	Walker, J. J.
TQ97	Sheppey	19 – –	Walker, J. J.
TQ76	Chatham	19 – –	Walker, J. J.
TQ9770	Sheppey	1900	Walker, J. J.
TR36	Ramsgate	1900	Champion, G. C.
TQ76	Chatham District	1899	Walker, J. J.
TR2236	Folkestone	iii.1896	Chitty, A. J.
TQ95	Doddington	1890	Chitty, A. J.
TR35	Sandy Lane, Deal	22.v.1884	Newbury, E. A
TR35	Deal	17.vi.1883	Hall, C. G
TQ57	Darenth	9.v.1880	Sharp, D.
TR23	Folkestone	1874	Champion, G. C.
TR3259	Richborough Roman Fort	1.v.1830	Newport, G.
TR3259	Richborough Roman Fort	6.iv.1830	Newport, G.

Tony Witts for providing his personal observations of *M. proscarabaeus* and those from the KMBRC database and Darren Mann for records from his Meloidae database. – M. T. JENNINGS, 206 Lower Higham Road, Gravesend, Kent DA12 2NN.

REFERENCES

Buglife. 2012. World Wide Web publication, Species Management Sheet, https://www.buglife.org.uk/sites/default/files/Oil%20Beetle%20management%20sheet.pdf

RSPB. 2014. http://www.rspb.org.uk/news/details.aspx?id=370663

Walters, J. 2011. World Wide Web publication; Oil Beetle Identification, http://johnwalters.co.uk/research/oil-beetle-identification.php

A record of Birch Sawfly *Cimbex femoratus* (L.) (Hymenoptera: Cimbicidae) in north Kent. – On 14.vii.2015 a specimen of this large, distinctive red-girdled sawfly was found under a Silver Birch tree *Betula pendula* in our garden at Copton Ash Nursery on the southside of Faversham (TR015598). A close-up photograph of this sawfly was kindly provided by Bjørli Lehrmann (Plate 10, Fig. 2). The NBN Gateway map shows a dearth of records of this sawfly from south-east England and there are relatively few records from Kent. Historical records from the Maidstone Museum Biological Archives compiled by Eric Philp are of singletons from Ashford (1936), Dartford (pre-1908), Keston (1923), Maidstone (1893, 1898) and Tunbridge Wells Common (undated). These indicate the sawfly was probably quite widely distributed in the county, though it should be noted most of the observations were probably by chance rather than of the insect in its native habitat which is difficult to discern from these records. For example, the last record written on the archive cards states "Maidstone, one female on pavement, 3 June 1960, (source) Morris 1961". Mike Morris confirms having the insect in his collection though he does not remember (and the data label does not quite confirm) the insect being found on a pavement.

More recent records from Laurence Clemons and Kent & Medway Biological Records Centre show the sawfly remains scarce with a scattered distribution in Kent, notably: Childs Forstal, East Blean (TR177644), 1973, E. Bradford; Tonbridge (tetrad TQ5846), 5.vi.1983, S. Melville; Aldington (TR068354), 1.vii.1998, M. Newcombe; Cowden Pound Pastures TQ459433, 2003, T. Mullender; TQ8254, 7.v.2008, K.Chuter and E. Philp; East Hoath Wood, Gillingham TQ799651, 4.v.2013, S. Springate. On 22.vi.2015 a specimen was found at Herne Common TR172639 by V. Breakell.

Interestingly, all of the Kent records are presumed to refer to sawfly adults, though this is not always stated categorically on the cards. It is highly likely that larvae of *C. femoratus* have been found in Kent but the lack of any affordable, suitably-illustrated key to sawfly larvae has hampered progress in this area. These thirteen records over a 120+ period suggest the sawfly is relatively uncommon in Kent compared with the north midlands and Scotland which are the centres of distribution of this species in the UK. – GILLIAN INGRAM, Copton Ash, Faversham, Kent ME13 8XW.

***Meloe brevicollis* Panzer (Coleoptera: Meloidae) and *Acritus nigricornis* (J. Hoffmann) (Histeridae) in Wiltshire.** – On 26.v.2015, I found a single female of *Meloe brevicollis* (Plate 10, Fig. 4) walking across a road at Allington Farm, Porton Down (SU221383), and nearby, sieving a grass-heap yielded a single adult histerid *Acritus nigricornis*. According to Darby (2009) both appear to be new species for Wiltshire. The surrounding habitat was rough grassland with ruderal areas, set amongst extensive high quality chalk grassland (which straddles the Hampshire/Wiltshire border area) where a rich invertebrate assemblage is known including *Meloe proscarabaeus* L. – JONTY DENTON, 31 Thorn Lane, Four Marks, Hants, GU34 5BX.

REFERENCE

Darby, M. 2009. *Wiltshire Beetles. History, Status, Distribution and Use in Site Assessment.* Sutton Mandeville: Malthouse Books.

Some observations on the behaviour of moles *Talpa europaea* L. during the exceptionally dry summer of 1976. – Back in 1976 I was familiar with the fact that Bladon Heath Wood in Oxfordshire was well-populated by moles because of the large number of signs of their work, both mole-hills and surface runs across the

woodland floor. But it was very seldom that I had seen the live moles themselves. That was up until the earth dried out and cracked all over the wood due to the extended period of dry weather experienced during the summer of 1976, when there was no significant rainfall for three months. From the end of July onwards all through August, on quiet morning walks around the wood it was common for me to see three or four separate moles working above ground tunnelling through the grass by the path or rustling about among the dry leaves under the trees. Out of a total of eight visits to the wood during this period, there was not one when I saw no moles at all above ground. Furthermore, it was a relatively simple matter to stalk them and observe them from a distance of 30–50 cm whereas at other times of the year they seemed more wary. If disturbed they would previously dig in and disappear completely. Now they were unable to do so. This gave me the opportunity to watch these creatures well as they searched for food. Indeed on several occasions I was able to get down on all fours and study these animals as they bit through grass-stems, sniffed under leaves and occasionally found small invertebrates to eat. At first the moles foraged near their dry surface runs, using them for refuge, and to travel from one feeding site to another. But later they seemed to be foraging further afield well away from established tunnels. On one occasion I touched one of the moles gently on the back as it was searching for food in the grass. It spun over on its back, raising one hind foot, and I only narrowly missed being bitten by quickly withdrawing my finger. On another occasion I took a small amount of meaty cat-food up to the wood, because more natural foods such as large earthworms were much more difficult to obtain. I placed a piece of cat-food in front of the nose of one of the moles. I assumed that it would be so hungry that it would relish this food and gobble it up. Instead it changed direction and walked past it. I placed another piece of food behind it. The mole walked back onto it but did not eat it. Apart from a few simple experiments such as this, I concentrated on watching these animals without interference. On one such occasion I was watching a mole who had just found a morsel of food and was noisily crunching it up when a second mole came up behind it to within 10 cm and screamed at it with a short, somewhat plaintive cry. The first mole quickly turned to face it and the second turned away and left.

On 28 August we had a heavy shower of rain and we had more rain each day for several days. On 26 August, my last visit to the wood before the rain, I saw four live moles and two dead ones. On 30 August during a fine interval I went back to the wood and found the ground thoroughly soaked. That day I saw no moles at all above ground, for the first time in over a month. Three more visits were made over the next few days, also with no sightings of moles, though freshly-made runs had been made in the surface of the ground. It was clear that the effects of the rain had enabled the moles to return to normal life once again.

Over the years I have spent long study periods in various British woodlands with resident moles, such as Wytham Wood, Oxfordshire, in 1979, Bentley Wood, Wiltshire, throughout the summer of 1983, Bernwood Forest which straddles the Oxfordshire/Buckinghamshire border, from September 1983 to late 1986, and many other woodlands and other habitats all over the British Isles since then, and in none have I witnessed such frequent and intensive behaviour of moles above ground. But none of the summers since then have been as intensely dry. In 1976 I had an idea that what I was witnessing was exceptional, and that I was very lucky to be having so many sightings of moles, and that has proved to be the case. – PAUL WARING, Windmill View, 1366 Lincoln Road, Werrington, Peterborough PE4 6LS. Email: paul_waring@btinternet.com

THE CADDISFLIES (TRICHOPTERA) OF LEICESTERSHIRE & RUTLAND (VC55)

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ABSTRACT

The status of caddisflies (Trichoptera) in VC55 (Leicestershire & Rutland) up to 2014 is reviewed. Validated records of 112 of the 199 British species have been collected from a variety of sources. The majority are regarded as being at least frequent or common in Britain but some e.g. *Tinodes pallidulus* McLachlan and *Hydropsyche saxonica* McLachlan are of national significance. Records for eight other species are regarded as being unreliable.

INTRODUCTION

This paper sets out to list the known trichopteran fauna of vice-county 55 which encompasses Leicestershire and Rutland in the East Midlands. The topography and geology of Leicestershire has been described in the county flora (Primavesi & Evans, 1988) while that of Rutland is documented in Messenger (1971). The two counties are predominantly agricultural with relatively few large centres of population. Leicestershire is mostly drained by the River Soar catchment which discharges to the north into the River Trent near Nottingham. The River Welland and its tributaries drain Rutland eventually discharging to the Wash in the east. VC55 also has the Grand Union, Ashby and Grantham canals which offer another range of aquatic habitats although these are under threat from growing recreational use. Reservoirs, which were mainly developed in Victorian times in Leicestershire (Blackbrook, Swithland, Cropston and Thornton) but somewhat later in Rutland (Eyebrook and Rutland Water), are key in wildlife protection in VC55 with many being major wintering roosts for wildfowl. The Leicestershire soils are predominantly neutral to acid whereas Rutland can be more alkaline in character. This gives an area of varied habitats that range from the pre-Cambrian upland Charnwood area and the Soar/Wreake valleys to the oolitic limestone areas of Rutland. Being agricultural the role of wildlife reserves and the extensive network of local wildlife sites are critical to the welfare of the natural history of VC55.

Entomological recording has been carried out since the mid-1800s in Leicestershire, but less so in Rutland, concentrating on Lepidoptera and Coleoptera (e.g. Bell & Bell, 1859; Robson, 1879). More recent work has included the less studied groups (e.g. Spooner, 1946; Fawcett, 1971). At the present time much more is being published about VC55 entomology than ever before both in local Newsletters and the national press (e.g. Lott, 2009). The introduction of NatureSpot, an on-line recording scheme, depending largely on the identification of species from photographs, has encouraged an interest in the wildlife of VC55 although its contributors are cautioned on the reliance of such means for effective recording (NatureSpot, 2009). Leicestershire & Rutland Environmental Records Centre, in partnership with county naturalists, operates the County Recorders Network with reports being published in the Leicestershire & Rutland Wildlife Trust-sponsored annual 'Leicestershire & Rutland Recorder'.

History of Caddis recording in VC55

The early presence of Trichoptera in Leicestershire was demonstrated during studies of palaeological deposits associated with the River Trent about 11,000 years ago (Greenwood, Agnew & Wood, 2003). Glacial deposits below two commercially exploited gravel beds located alongside the River Trent (Barrow on Trent, Derbyshire; Hemington, Leicestershire) were extracted to recover fossil insect remains by sieving and flotation. Identification of caddis was by examination of the shape, size and colour pattern of larval frontoclypeal apotomes. A total of 31 taxa were isolated with 21 coming from Barrow on Trent and 16 from Hemington. Table 1 shows the species found in the Hemington deposits all of which, with the exception of *Limnephilus subcentralis* (Brauer), are present in the current fauna of Leicestershire & Rutland.

In more recent times, a brief note by Revd George Crabbe in a report on the natural history of the Vale of Belvoir in north-east Leicestershire (SK8233; Crabbe, 1795) mentioned caddisflies referring to the "Phryganea" saying "the larva of these insects are called Case-worms, and are found abundantly in pools and ditches; they are common bait for angling; the species of this insect are here met with in great abundance". There is a very brief mention of Trichoptera when James Harley, a noted local Victorian naturalist, says in his diary entry for 8 May 1840 "Phryganea or water moths appear" but with no species or location details with further, even briefer, notes on their appearance on 1 May 1843 and 28 April 1844 (Harley, 1840–1844). Reference to the Trichoptera was not then made until the publication of the Victoria County History volumes covering each county. Even then, information was sparse with caddis not being mentioned in the Leicestershire issue (Bouskell, 1907) and just once (*Limnephilus rhombicus* Linnaeus) in the Rutland volume (Douglas, 1908). The Hinckley Times (22 March 1929) noted that the Hinckley Ramblers had seen caddisflies (unidentified) by the River Tweed near Barwell, south-west Leicestershire (SP4397) demonstrating that observations may come from the least expected of sources. For the next 40 years or so very little attention was paid to these insects in VC55 an exception being the collecting in 1959 of the leptocerid *Triaenodes bicolor* (Curtis) from the Grand Union Canal at Kibworth (SP6695) during studies on larval case construction (Tindall, 1960).

The number of records increased in the 1960s and 1970s, being obtained from larval surveys and light trapping. Using these data Gray (1975) produced the first summary of the Trichoptera in VC55 based on about a thousand observations. He included caddisflies recorded at a Rothamsted light trap operating at Sutton Bonington but whilst this site has a Loughborough (hence Leicestershire) post code,

Table 1. Trichoptera identified from River Trent glacial deposits at Hemington, Leicestershire (Greenwood *et al.*, 2003).

Family	Species
Polycentropodidae	*Holocentropus picicornis* (Stephens)
Hydropsychidae	Unidentified taxa
Phryganeidae	*Agrypnia pagetana* Curtis; *Phryganea bipunctata* Retzius
Brachycentridae	*Brachycentrus subnubilus* Curtis
Limnephilidae	*Anabolia nervosa* (Curtis); *Grammotaulius* sp; *Limnephilus decipiens* (Kolenati); *L. subcentralis* (Brauer); unidentified taxa ×4
Molannidae	*Molanna angustata* Curtis
Leptoceridae	*Athripsodes aterrimus* (Stephens)

it is actually just inside Nottinghamshire. By excluding this trap site, Gray reported on 34 species in Leicestershire & Rutland. Not included in this review was an undergraduate project report (Greenway, 1970) examining the physicochemical and biological quality of the Pocketbrook/Woodbrook stream originating in the Charnwood Forest. This study referred to the occurrence of caddis larvae in much of its length with the insects being predominantly associated with the upper unpolluted reaches. However, none were detected in the waterway after the Loughborough sewage discharge above its confluence with the River Soar. Very little in the way of identification was done beyond family (with some indication of abundance) although larvae of *Hydropsyche instabilis* (Curtis) and *Silo pallipes* (F.) were mentioned but without detailed records. An ecological study of north-east Leicestershire as part of a coalfield development reported on the occurrence of larvae in field ponds near Asfordby (SK7222) but with no identification of taxa (Evans, 1979).

Further activity came in the 1980s when research projects produced large numbers of records. Goddard (1985) reported the occurrence of *Ceraclea senilis* (Burmeister) at Ashby de la Zouch (SK3621) on 7 August 1981 while a malaise trapping project (1980-1982, 1990) on the Wood Brook near Loughborough, carried out by the University of Loughborough (Greenwood, Bickerton & Petts, 2001), found the nationally uncommon *Tinodes pallidulus* McLachlan (Greenwood & Hobday, 1988). Many caddis larval records came from a Leicestershire Museums Service-funded study of Leicestershire streams in 1983 carried out by Leicester University under the supervision of Dr David Harper (Harper, 1983). Investigations, carried out as part of a Leicester University undergraduate/postgraduate study on streams in the Eye Brook catchment in east Leicestershire found larvae of the nationally rare *Hydropsyche saxonica* McLachlan (Blackburn & Forrest 1995; Forrest, Harper, & Blackburn, 1995) although, as yet, the original data have not been located. Later the presence of this species in this catchment was confirmed by larval records from the Environment Agency in 1995 and then again in each year of 2001–2004. During the establishment of a nature reserve in north-east Leicestershire, ponds were developed as refuges for wildfowl by the Leicestershire Wildfowlers' Association from which four species of adult caddis were identified in a limited survey (Shelton, 2007).

From 2010 county lepidopterists started to regularly collect adult caddis that came to light traps and this now results in about a thousand records being added annually to the VC55 database. During 2014 this was enhanced by the operation of a Malaise trap at Rutland Water, the largest nature reserve in VC55, along with recovery of caddis from the Rothamsted light trap operating at this site. Surprisingly relatively little invertebrate recording (other than Lepidoptera, Odonata, Orthoptera and hoverflies) had been carried out in the first 40 years of the reservoir's existence despite being a site of international importance (RAMSAR).

In 2013, all data available at that time were used to produce a provisional atlas of Trichoptera in Leicestershire & Rutland (Morris, 2013). This was based on the records held in the county ecological archives (Leicestershire & Rutland Environmental Resources Centre), the few published reports and records obtained from light traps operated by local moth recorders in the first decade of the present century. Only the summary data from the Loughborough University Wood Brook research were included as the original records were not available at that time. Similarly, the extensive larval data generated by the Environment Agency as part of a national water quality monitoring programme and from the national monitoring project operated by the Centre for Environment & Hydrology (RIVPACS) had not been known to the author. Even so, the paper listed 97 species of the 199 on the British list and involved examination of about 1,600 records.

This present review greatly expands the knowledge of this interesting insect group in Leicestershire & Rutland being based on about 9,100 records. The database is deposited with the county record centre but maintained by the author.

Sources used for this checklist

Larval records

The majority of larval data come from Environment Agency water quality monitoring (data supplied by Ian Wallace, National Trichoptera Recorder) and the unpublished larval surveys of the Leicestershire Rivers Project (Harper, 1983). In both cases, some of the species recorded are of dubious provenance possibly due to misidentification by inexperienced personnel. Further larval data came from the RIVPACS recording scheme (*www.ceh.ac.uk/products/software/rivpacs.html*) where regular samplings at three Leicestershire sites were carried out, with records being kindly provided by Ian Wallace. The detailed larval data generated as part of research by Blackburn & Forrest (1995) on the Eye Brook catchment (mentioned above) remain to be added to the database when located.

Adult records

Early records came from documents held by the Leicestershire & Rutland Environmental Records Centre and had been used in the review by Gray (1975). These mainly resulted from light trapping in the 1960s by a handful of moth recorders in Leicestershire but not Rutland. In the 1970s Don Hall-Smith of Leicester Museum encouraged retention of caddis from garden moth traps with identification being mainly undertaken by Colin Hobday (principal biologist with Severn Trent Water, later the National Rivers Authority and Environment Agency) and John Gray (then at Bolton Museum). There was a lull until 2010 when caddis from a Loughborough light trap (run by Megan Dimitrov, SK5120) were sent to Stuart Crofts in Yorkshire for identification (records supplied by Ian Wallace). In 2012 specimens were being sent to Ian Wallace at Liverpool Museum by Graham Calow of Sapcote (SP4994) in south-west Leicestershire who was compiling a photographic catalogue of the natural history of his local parish as part of a village heritage project. Since 2012 the current author has taken on responsibility for the caddis records for VC55 identifying caddis from light traps operated throughout the two counties using Barnard & Ross (2012) as well as Mosely (1939) and Macan (1973). A further aid to identifying caddis was the excellent Trichoptera Scandinavica web site of genitalia photographs (Tobias & Tobias, 2008).

In 2014 adult caddis were recorded at Rutland Water Nature Reserve utilising a malaise trap (at two sites) and recovered from the catches in the Rothamsted light trap located near the Egleton Birdwatching Centre (SK8807). Surprisingly, this light trap has been run here for many years but, other than macro-moths, no other insect groups were being recorded with trap material being thrown away. A second Rothamsted light trap is understood to operate a few miles from Rutland Water in an arable situation at the Game & Wildlife Conservation Trust Allerton Project, Loddington (Rutland) but, to date, it is not known if caddis recording has been carried out and no records have been located in the county archives.

A major dataset of adult caddis came from the studies carried out by Loughborough University (1980–82 & 1990) supervised by Malcolm Greenwood (Greenwood, Bickerton & Petts, 2001). This research programme studied adult stoneflies, mayflies and caddis using malaise traps at fixed points on the Wood Brook

(SK5016) which flows off the Charnwood Forest into the River Soar below Loughborough with caddis being identified by Colin Hobday. Catches were 7-day composites. Fortunately Hobday's original identification log books for this study still exist (kindly made available by Peter Barnard) making it possible to recover the raw data used in summarised form for the published report. This study was important, not just for the vast amount of data generated for a single waterway but also for the discovery of the rare psychomyiid *Tinodes pallidulus* McLachlan (Greenwood & Hobday, 1988).

Annotated checklist

The arrangement of this checklist follows that in Barnard & Ross (2012) from which comments on national distribution are drawn.

RHYACOPHILIDAE

Rhyacophila dorsalis (Curtis): common throughout Britain. Some of the larval records come from the RIVPACS study but most originate from the Leicestershire Rivers Project indicating that the species is widespread in VC55. Recent adult records have come from moth light traps, nearly all previous adult records having come from the Wood Brook survey.

Rhyacophila fasciata Hagen: a species scattered throughout Britain but with only three VC55 records (1993, 1998, 2002) all being larvae from Rutland rivers during Environment Agency river quality surveys, confirming its tendency to be located in calcareous areas.

GLOSSOSOMATIDAE

Agapetus fuscipes Curtis: common throughout Britain. Larval records come mainly from Rutland whereas adult records are from the west side of Leicestershire particularly during the Wood Brook project.

Agapetus ochripes Curtis: found throughout much of Britain but not in the east. This is a rare species in VC55 with a single larval record from Long Whatton Brook (SK4824) in 1999. All nine records of adults are from a moth trap at Sapcote (SP4994), first in 2013 and again on a further eight occasions during spring and early summer 2014.

Glossosoma boltoni Curtis: a predominantly northern and western species which has only recently been identified in VC55 with an adult swept from a river bank at Lubenham (SP7187) on 2 July 2013 followed by another taken at the author's Dadlington light (SP4198) on 26 September 2014.

Glossosoma conformis Neboiss: another mainly northern and western species. It is a recent addition to the VC55 list having being recorded as a larva from the River Sence at Shackerstone (SK3807) 5 April 2009 and an adult at the Sapcote moth trap on 19 July 2014.

HYDROPTILIDAE

Agraylea multipunctata Curtis: common throughout Britain. Of the 33 VC55 records 12 are of adults all taken in the west of the area while Environment Agency larval records from the 1990s show an easterly distribution probably reflecting uneven recording effort

Agraylea sexmaculata Curtis: found throughout Britain. Known only as adults in VC55 being taken at garden light traps first in 1981 (Leicester SK6102) but not again until 2011 since when it has been seen at several light traps in the west of VC55.

Hydroptila forcipata (Eaton): common throughout Britain but only known as adults in VC55 being taken on five occasions during the Wood Brook Malaise trap study in 1982 and then not again until 2012 when swept from vegetation adjacent to a stream at Osbaston (SK4205). A further two adults were taken at garden lights at Market Bosworth (SK4003) in 2013 and at Sapcote in 2014.

Hydroptila martini Marshall: an uncommon species in Britain and known in VC55 only from the Wood Brook investigation when nine individuals (2 male, 7 female) were recorded in the period June–July 1982.

Hydroptila occulta (Eaton): found throughout Britain but not common. Four adults were taken in the Wood Brook Malaise trap during June–July 1982 but not again until at a Dadlington (SP4198) garden light trap on 14 & 17 July 2014. All records are of male adults.

Hydroptila simulans Mosely: often common throughout Britain but only found in VC55 when taken at the Sapcote light trap (3 July 2014) being identified by Ian Wallace.

Hydroptila sparsa Curtis: a southerly species with all VC55 records being of adults taken at garden light traps; the first was in suburban Leicester (SK6102) in 1980 and then at a further three sites in west Leicestershire thirty years later (2011–2014).

Hydroptila tineoides Dalman: common throughout Britain. Only known from adult records in west Leicestershire all from light traps. The Sapcote light accounted for 11 of the 14 records the rest being singletons from three other sites.

Hydroptila vectis Curtis: nationally common. Initially only known from adults taken during the Wood Brook survey site which was particularly rich in this species with several instances of hundreds being caught e.g. 23 June 1982 with 231 males and 136 females. Twenty years later, one was taken at the Sapcote light in 2011 with another four from a light trap operating adjacent to the Grand Union Canal in Loughborough (SK5320) in 2013.

Ithytrichia lamellaris Eaton: common throughout Britain. All larval records come from Rutland waters (13, Environment Agency) while adults (21 male, 15 female) originate from the Wood Brook survey (June–July 1990). The species was not recorded again until an adult was found on a River Lin culvert at Bradgate Park (SK5411) on 6 June 2014.

Orthotrichia costalis (Curtis): throughout Britain but not common. There are only three VC55 records all of adults at light traps in Sapcote and Dadlington in south-west Leicestershire in June–August 2014.

Oxyethira falcata Morton: even though this species is common throughout Britain, in VC55 it is only known from a single male taken on 1 August 1990 at Wood Brook.

Oxyethira flavicornis (Pictet): common throughout Britain. Apart from a single, probably larval, record in 1962 from the Grand Union Canal south of Leicester at Kilby (SK6396), all records of this species are of adults taken at the Sapcote light trap in the period 2011–14 being identified by Ian Wallace.

PHILOPOTAMIDAE

Wormaldia occipitalis (Pictet): a western and northern species having been recorded in VC55 on six occasions in the Wood Brook survey in 1980 and 1990.

ECNOMIDAE

Ecnomus tenellus (Rambur): a southern and western species extending into the Midlands. The Environment Agency recorded the larva at Debdale Wharf on the

Grand Union Canal (SP7092) in 1991 with the first adult taken at light at Loughborough in 2009. Since that time the same light trap has regularly attracted the species which is now turning up at other moth traps in west Leicestershire and on one occasion (2013) at Priory Water NR in the north-east (SK7118).

POLYCENTROPODIDAE

Cyrnus flavidus McLachlan: throughout much of Britain. Adults were taken at two VC55 garden lights (1981 and 2013) as well as at the Wood Brook Malaise traps (1981-2). The remaining records (26) are of larvae from scattered sites in VC55 but particularly at Debdale Wharf on the Grand Union Canal.

Cyrnus trimaculatus (Curtis): a common species throughout Britain being reflected in its occurrence in VC55. Records (114) of this species are more numerous than the previous species with larvae being recorded throughout VC55. Adults were particularly frequent at the Wood Brook and Sapcote traps being occasional at other garden lights.

Holocentropus dubius (Rambur): throughout Britain but an uncommon species for VC55. A pond at Little Wittenham (SP5793) had larvae in 1989 and 1990. Adults, in contrast, were not recorded until taken at the Loughborough light in 2010 and then again at three other scattered light traps always as singletons.

Holocentropus picicornis (Stephens): found throughout Britain. As with the previous species, larvae were found at Little Wittenham pond with another at Debdale Wharf (1998). Lone female and male adults were taken at Wood Brook (1981 and 1982 respectively). Singletons were taken at the Sapcote light trap each year 2011–2014.

Neureclipsis bimaculata (L.): local in England. In VC55 known from a single 1989 larval record (Eye Brook SP8793) and single adults taken in 2009 and 2010 at the Loughborough light trap.

Plectrocnemia conspersa (Curtis): common throughout Britain. In VC55 larval records (62) come from the east and west of the area with none down the central area whilst adults (61) are only from western Leicestershire, most associated with the Wood Brook project. From 1990 to 2012 no records have been located but since 2013 this caddis has been occasional at a few garden light traps.

Plectrocnemia geniculata McLachlan: mainly north and west in Britain with VC55 larval records from three scattered locations (1983, 1989, 2002) but no adults.

Polycentropus flavomaculatus (Pictet): common throughout Britain. A widespread species in VC55 with 87 adult records and 123 of larvae.

Polycentropus irroratus (Curtis): regarded as local but occurring throughout Britain. In VC55 of the 82 records only two are of larvae, both from the RIVPACS study. The adult records are mostly associated with Wood Brook although there are scattered single records from three other locations operating light traps in recent years.

PSYCHOMYIIDAE

Lype phaeopa (Stephens): common throughout Britain. Apart from three larval records this species is only recorded as adults taken at Malaise and light traps across VC55.

Lype reducta (Hagen): the status of this caddis is considered uncertain because of doubts over larval identification. Hence the widespread VC55 records of larvae must be treated with caution. Adult records come mostly from the Wood Brook survey and it was not recorded again until 2013 and 2014 at two moth traps in south-west Leicestershire.

Psychomyia pusilla (F.): common throughout England and Wales with the few VC55 records of this species limited to the west of Leicester. Larval records from several waterways were reported by the Environment Agency (1985–2009) but adults have only been found at the Loughborough light trap (2012–2013) with one other record from Sapcote in 2014.

Tinodes maclachlani Kimmins: nationally a local species. In VC55 known mainly from adult records in the Wood Brook Malaise trap survey but not again until 2010 when swept at Grace Dieu Wood (SK4317). Two further records came from Rutland Water NR when singletons were taken in 2014, one from a moth trap in the North Arm marsh (SK8709) and the other from the Rothamsted trap.

Tinodes pallidulus McLachlan: a nationally rare species only taken in the Malaise trap survey at Wood Brook with eight males and 13 females recovered throughout the survey period (1980, 1981, 1990), reported in Greenway & Hobday (1988).

Tinodes waeneri (L.): common throughout Britain (Plate 11, Fig. 1). There are numerous widespread larval records in VC55 with adults being particularly common at the Wood Brook Malaise traps and also at the Sapcote moth trap.

HYDROPSYCHIDAE

Cheumatopsyche lepida (Pictet): fairly widespread in Britain but local. No larval records have been located but adults have been regularly taken at moth traps in the west of VC55 since 2010.

Hydropsyche angustipennis (Curtis): a common, widespread species with numerous larval records in VC55 but fewer adults mainly from Wood Brook and scattered light traps with only two records since 1990.

Hydropsyche contubernalis McLachlan: occurs throughout Britain with both adults and larvae having a widespread distribution in VC55. Often found at moth traps.

Hydropsyche instabilis (Curtis): a widespread species with both larvae and adults being found throughout VC55. Adults may occur in large numbers at light traps.

Hydropsyche pellucidula (Curtis): nationally a very common caddis with larval records coming from most parts of VC55 whilst adults are regularly taken at light traps. Interestingly not taken during the Wood Brook study.

Hydropsyche saxonica McLachlan: nationally a very local species. First reported from streams in the River Eye catchment in east Leicestershire (Blackburn & Forrest, 1995) although the original data have not yet been found. The caddis was later confirmed as being present in this catchment by Environment Agency larval monitoring in 1995 and each year in 2001–2004. No adult records.

Hydropsyche siltalai (Döhler): another nationally common member of this genus with larvae being found throughout VC55 (Plate 11, Fig. 2). Adults were numerous in the Wood Brook study and are now occasionally being taken at moth traps.

PHRYGANEIDAE

Agrypnia pagetana Curtis: a local species with scattered occurrence in VC55 with only 14 records of larvae and adults in the period 1979–2014.

Agrypnia varia (F.): even though considered common throughout Britain in VC55 only adults have been recorded and then usually as singletons at light traps.

Oligotricha striata (L.): another nationally local caddis being only known from a pond in the Beacon Hill Country Park in the Charnwood area of Leicestershire when noted during a study on the effects of catchment acidification (Loughborough University, 1991). Reported as being present at this site during 1985–86 but no details were provided.

Phryganea bipunctata Retzius: common throughout Britain, and widespread in VC55 with many larval records from Environment Agency monitoring but few of adults, all singletons mainly taken at light.

Phryganea grandis L.: found throughout Britain this large caddis is frequently encountered in VC55 being found throughout both counties.

BRACHYCENTRIDAE

Brachycentrus subnubilus Curtis: found throughout Britain although considered to be declining in some southern areas. A single larval record from the River Welland at Duddington (SK9901) in 2007 (Environment Agency) followed by a single male adult from Grace Dieu Wood (SK4318) in 2009 and another male from Sapcote (SP4994) in 2013 are the only VC55 records.

GOERIDAE

Goera pilosa (F.): a widespread species both nationally and in VC55 both as larvae and adults, the latter being regular at light but never in large numbers.

Silo nigricornis (Pictet): widespread throughout much of Britain. VC55 larval records are from Rutland and western Leicestershire with none in the area between. Only recorded as adults on two occasions when taken at The Outwoods near Loughborough (SK5116) in 1988 and then at light in Dadlington (SP4198) in 2014.

Silo pallipes (F.): found throughout Britain with adults being frequent throughout the Wood Brook survey. Not recorded again until found at Grace Dieu Wood (SK4417) in 2011 then subsequently taken during 2013 and 2014 at two Dadlington light traps and at Hallaton (SP7897) on 21 May 2014, always as singletons. Numerous larval records come from Rutland but few in Leicestershire with the exception of the Charnwood area where they are particularly associated with feeder streams to Blackbrook and Swithland reservoirs.

LEPIDOSTOMATIDAE

Crunoecia irrorata (Curtis): whilst being common throughout Britain, VC55 records of adults of this species are entirely from the Malaise trap study on the Wood Brook (10 records) with the exception of a singleton from Sapcote in 2014. There are only four widespread larval records.

Lepidostoma hirtum (F.): common throughout Britain and widely occurring in VC55 with numerous larval records (Plate 11, Fig. 3). Adults are frequently recorded from light traps.

LIMNEPHILIDAE

Drusus annulatus (Stephens): a very common species throughout Britain. Larvae are encountered throughout VC55 as are adults although the majority of these originate from the Wood Brook survey.

Chaetopteryx villosa (F.): common throughout Britain. VC55 larval records are widespread but not numerous. All adult records come from Wood Brook in 1990 sometimes being numerous with a predominance of males.

Anabolia nervosa (Curtis): common throughout Britain, with widespread larval records in VC55. The few adult records (12) are mostly from the Sapcote moth trap (7) with the remainder being single records from 4 other sites. The sole record during the Wood Brook project was of a female taken in 1982.

Glyphotaelius pellucidus (Retzius): this distinctive widespread species occurs regularly at VC55 moth lights although not so frequently at the Wood Brook Malaise traps. Records of both adults and larvae have come from across VC55.

Grammotaulius nigropunctatus (Retzius): fairly common throughout Britain but not so in VC55 being known only from seven adult records prior to 1980. A single male came to light at Mountsorrel Marshes NR (SK5715) on 16 April 2015.

Limnephilus affinis Curtis: common throughout Britain but only known from adult records occurring across VC55. Noted in the period 1960–1990 but not again until 2009. Frequently encountered at the Wood Brook Malaise traps but more prominently at light traps.

Limnephilus auricula Curtis: the species national occurrence is mirrored in Leicestershire and Rutland being very commonly taken at light traps and also at Wood Brook. Of the 246 records from VC55 only two are of larvae.

Limnephilus binotatus Curtis: local in England and Scotland. First recorded in VC55 near the Grand Union Canal, Kilby (SP6197) in 1963 but not again until taken at light in Market Bosworth (SK4003) in 2013.

Limnephilus centralis Curtis: apparently common throughout Britain but to date only five records of this species (two adults, three larvae) have been located for VC55 all coming from the Charnwood district in 1982, 1986, 1990 and 2011.

Limnephilus decipiens (Kolenati): widespread in the southern half of England. Scattered adult records come from light traps in the west of VC55 and recorded in 2014 at the Rutland Water NR Rothamsted trap when it was noted over the period September to November. A single larval record came from a pond at Little Wittenham in 1990.

Limnephilus extricatus McLachlan: common throughout Britain. VC55 larval records show a wide distribution of this species with the few records of adults being noted from Wood Brook Malaise traps and from light traps in south-west Leicestershire.

Limnephilus flavicornis (F.): nationally common and a widespread species in VC55 both as larvae and adults with the latter particularly frequent at light traps.

Limnephilus fuscicornis (Rambur): nationally a fairly widespread species but not common. In VC55 there were a few scattered larval records between 1981 and 2000. A single adult was taken on two occasions in 2014 at the Sapcote light trap.

Limnephilus griseus (L.): whilst regarded as being common throughout Britain this is not reflected in Leicestershire and Rutland where the single VC55 record for this species was of an adult at a Dadlington light (SP4198) on 17 July 2013.

Limnephilus hirsutus (Pictet): local but widespread in Britain. In VC55 the species is known from the scattered adult records mainly from light traps operating in 2013–2014. Previously only known from a light trap in 1967 at Barrow on Soar (SK5817) north of Leicester in the River Soar valley.

Limnephilus incisus Curtis: this distinctive limnephild is common throughout Britain but in VC55 is only known from adult records mostly from 1979–1981. A singleton was swept from herbage at Fosse Meadows Country Park (SP4991) 15 August 2014.

Limnephilus lunatus Curtis: perhaps the commonest caddis in Britain which is reflected in its frequent capture in light traps in VC55.

Limnephilus marmoratus (Curtis): a common species in Britain. Widespread in VC55 with adults being regularly taken at light but not in large numbers.

Limnephilus nigriceps (Zetterstedt): scattered records from England. Only recorded twice in VC55, the first (5 October 1963) being two adults swept at the Grand Union Canal, South Wigston (SK6197). The species was not seen again until 2014 when one was attracted to light at Mountsorrel Marshes NR (SK5915) adjacent to the River Soar.

Limnephilus politus McLachlan: another local species nationally. One male and five females were taken on 5 October 1963 being identified by D. E. Kimmins. A further record came from the Priory Water NR but with no details (Shelton, 2007).

Limnephilus rhombicus (L.): common throughout Britain but there are relatively few VC55 records. The Environment Agency reported the larvae on five occasions, with adults occasionally being taken at light particularly at Sapcote.

Limnephilus sparsus Curtis: common throughout Britain. In VC55 this caddis was taken at light at Barrow on Soar (SK5817) in 1966, in Leicester (SK6102) in 1980 and Sapcote in 2011–2013 along with other scattered observations. Two larval records came from ponds in 1992, one in the north of Leicestershire and the other in the south.

Limnephilus stigma Curtis: nationally a local species with only three VC55 adult records (1962, 2013 and 2014) all coming from the west side of Leicester.

Limnephilus vittatus (F.): a common species in Britain. It occurs throughout VC55 being mainly recorded as adults. Large numbers were recorded during the Wood Brook survey with 26 male and 69 females taken from one Malaise trap on 22 September 1982.

Halesus digitatus (Schrank): common throughout mainland Britain. A scattered distribution of both larvae and adults in Leicestershire but only two larval records from Rutland both in 1999.

Halesus radiatus (Curtis): common throughout Britain (Plate 11, Fig. 4). In VC55 this species is more numerous than *H. digitatus* with larval records being found throughout both counties. Adult records come mostly from west Leicestershire light traps although never frequent.

Micropterna lateralis (Stephens): common throughout Britain. A widespread species in VC55 with adults frequent at the Wood Brook site and occasionally coming to light. A few scattered larval records.

Micropterna sequax McLachlan: nationally a common species. In VC55 larval records are mostly from the east of the area whilst adults are from the west. The species was recorded from the Wood Brook Malaise traps throughout the survey period usually in ones or twos.

Potamophylax cingulatus (Stephens): common throughout Britain but not so in VC55. Two adults were taken at light in Rutland (Clipsham Quarry NR, SK9815) on 19 June 2014 and on two occasions at Wood Brook (1980, 1990). Larval records are almost all from north-west Leicestershire.

Potamophylax latipennis (Curtis): common throughout Britain, and the most common member of this genus in VC55 although never numerous. Larval records are widespread with the five adult records coming from the west of the area being taken at light and malaise traps.

Potamophylax rotundipennis (Brauer): throughout Britain but local. A rare species for VC55 having been found on only three occasions as larvae, once in Leicestershire (2006) and twice in Rutland (2000).

Stenophylax permistus McLachlan: common throughout Britain, this species is found throughout Leicestershire and Rutland mainly being recorded as adults at Malaise and light traps (Plate 12, Fig. 1). The few larval records come from the south and south-east of VC55.

Stenophylax vibex (Curtis): nationally a local species. A male adult taken at Wood Brook on 31 October 1990 is the sole VC55 record.

SERICOSTOMATIDAE

Sericostoma personatum (Spence): common throughout Britain. Larval records are numerous and widespread in VC55 whereas adults, with one exception, are recorded at Wood Brook (1980, 1982, 1990). The other adult record originated a few kilometres further to the west at Grace Dieu Wood (SK4318) after an interval of 21 years (10 May 2011).

BERAEIDAE

Beraea maurus (Curtis): whilst found throughout much of Britain this species is uncommon in VC55. Adult records came from Wood Brook in 1980 and 1990 and larval sightings are few but scattered.

Beraea pullata (Curtis): common throughout Britain but the VC55 occurrence is similar to that of *B. maurus* with adults from the Wood Brook project and recently from Grace Dieu Wood (2009). The two larval records come from a pond at Little Wittenham (1990) and a stream at Grace Dieu Wood (2010).

Beraeodes minutus (L.): nationally uncommon. In VC55 only known from a handful of larval records; last taken from the River Sence at Shackerstone (SK3807) in 2009.

ODONTOCERIDAE

Odontocerum albicorne (Scopoli): whilst being considered common throughout much of Britain this is a rare species for VC55with a single larval record coming from Environment Agency monitoring of the Rothley Brook (SK5913) in 1995. Adults were attracted to the author's light trap at Dadlington (SP4198) on 19 July 2013 and to a light at Market Bosworth (SK4008) on 30 July 2013 and 30 August 2013.

MOLANNIDAE

Molanna angustata Curtis: common in England. In VC55 it is frequent at both Malaise and light traps although usually as singletons. Larval records, mainly from the Environment Agency, show a widespread distribution.

LEPTOCERIDAE

Adicella reducta (McLachlan): apparently common throughout much of mainland Britain but not so in VC55 being known from two larval records from the River Gwash feeding into Rutland Water (2000–2001) and two adults at light traps (Dadlington and Sapcote) within two days of each other in July 2014.

Athripsodes albifrons (L.): common throughout Britain but rare in VC55, being known from a single 1998 larval record (Bradgate Brook, SK5210) and two adult records from Rutland light traps – Barrowden (SK9400) on 9 August 2010 and reedbeds at Rutland Water (SK8908) on 6 July 2013.

Athripsodes aterrimus (Stephens): common throughout Britain. There are numerous records of both larvae and adults in VC55 showing a widespread distribution but never encountered in large numbers.

Athripsodes bilineatus (L.): occurring throughout Britain and a widespread species in VC55 based on larval records. The majority of adults have been recorded as part of the Wood Brook survey where, on occasions, numbers recovered have been large e.g. 546 male and 479 females on 27 June 1990. Adults were not recorded after 1990 until singletons were taken at four scattered light traps in 2013 with a further site in 2014.

Athripsodes cinereus (Curtis): common in Britain being a widely dispersed species both as adults and larvae in VC55 (Plate 12, Fig. 2). Frequently taken at Wood Brook, although not as numerous as *A. bilineatus*. Regular at light traps since 2010.

Ceraclea albimacula (Rambur): throughout Britain but not common. Locally known only from a single larval record on 6 June 1997 when kick-sampled from the River Sence at Ratcliffe Culey (SP3299) west Leicestershire.

Ceraclea dissimilis (Stephens): found throughout Britain. A widely, but thinly, distributed species in VC55. Two larval records come from two Rutland locations whilst adults have been taken at light traps with the Loughborough site regularly attracting this species.

Ceraclea fulva (Rambur): common in much of Britain but only known in VC55 from two adult records taken at Sapcote (2013) and Bradgate Park (2014) light traps. No larval records.

Ceraclea nigronervosa (Retzius): even though regarded as common throughout Britain, this species has only recently been recorded in VC55 when single males were taken at three widely dispersed moth traps during 2013 and 2014.

Ceraclea senilis (Burmeister): common in the southern half of Britain. This is the commonest member of the genus in VC55 although never numerous. Adults have been recorded from widely dispersed light traps whereas larvae have only been found at two sites both in the River Soar catchment.

Leptocerus tineiformis Curtis: nationally common, with widely scattered adult records from light traps in VC55, mostly from 2010 onwards, and only two larval records from well-separated sites in Leicestershire.

Mystacides azurea (L.): a familiar swarming caddis fly which is widely distributed nationally and throughout VC55 as larvae and adults. The Rutland Water NR Rothamsted trap accumulated 352 individuals in the 20–23 June 2014 composite catch.

Mystacides longicornis (L.): throughout Britain. This species has a very similar occurrence and distribution to *M. azurea* in VC55, though adults have not been encountered in such high numbers as that species.

Mystacides nigra (L.): nationally a local species, and is the least common of this genus in VC55 with very few larval records. Adults have been regularly taken at the Loughborough light trap located near the Grand Union Canal.

Oecetis furva (Rambur): throughout Britain although with few records. Unknown in VC55 until 2014 when adults were taken at light traps throughout the two counties, including 14 at Priory Water NR (SK7118) on 19 August 2014.

Oecetis lacustris (Pictet): common throughout Britain but only recently found in VC55, the first record being at the Loughborough light trap in 2010. In 2014 it was attracted to a handful of lights in the west of the area and at the Rutland Water NR Rothamsted trap when nine were caught.

Oecetis ochracea (Curtis): nationally common and the commonest of the genus in VC55, being regularly taken at light. It was frequently found in the Wood Brook Malaise traps in 1982 but not in the other years of the study. The Rutland Water NR Rothamsted trap accumulated a total of 136 during a 10-day period in June 2014.

Oecetis testacea (Curtis): throughout much of Britain but only recently found in VC55. It was first recorded in 2013 when taken at a garden light trap in east Leicester (SK6404). In 2014 one was taken at the Sapcote light trap and another was found in a Malaise trap at Rutland Water (SK8906) at the end of August 2014.

Triaenodes bicolor (Curtis): common throughout Britain but not so in VC55. There are a few scattered larval and adult records spanning the period 1959 to 2012. Tindall (1960) reported the larvae as being "many" in the Grand Union Canal at Kibworth Harcourt (SP6695) in 1959.

Dubious records

The VC55 database also includes reference to eight species considered to be of dubious provenance which require examination of voucher specimens to establish validity of the records.

Allogamus auricollis (Pictet): a local species of the west Midlands and northwards. In the VC55 database there are many widespread larval records from the mid-1980s (but no adults) with no further notes on this caddis since 1986. These records originated from the Leicestershire Rivers Project and misidentification is most probably due to inexperienced staff involved in the project.

Diplectrona felix McLachlan: another northern and western species, suggesting that the Environment Agency larval record (16 January 1986) from the Rothley Brook (SK586128) just north of Leicester is probably unsafe.

Hydropsyche fulvipes (Curtis): a very local species in the country. The VC55 database has ten widespread larval records with none later than 1999. Misidentification is likely.

Limnephilus borealis (Zettertstedt): 1986 larval records from Saddington Brook (SP6690) and the River Lin at its exit from Swithland Reservoir (SK5616) are shown in the Leicestershire Rivers Project report. Comments in Barnard & Ross (2012) along with distribution data on the NBN Gateway show this species to be restricted to the Scottish Highlands. Accordingly the VC55 records are not considered plausible.

Mesophylax impunctatus McLachlan: two 1986 larval records from the Leicestershire Rivers Project are from Countesthorpe Brook (SP6093) and the River Welland (SP8951) and are present on the NBN Gateway. There seem to be few records nationally and Barnard & Ross (2012) consider this species to be confined to north-west England and Scotland. Accordingly the VC55 records are considered to be erroneous.

Polycentropus kingi McLachlan: another northern and western species. The VC55 database holds 18 larval records being particularly associated with rivers in Rutland originating with the Environment Agency. Access to archived specimens would be needed to confirm the validity of the presence of this caddis inVC55.

Psychomyia fragilis (Pictet): the national records of this species are widely scattered. Two Environment Agency larval records from the River Trent at Sawley on the Leicestershire-Derbyshire border in 1986 and from the River Eye at Saxby in north-east Leicestershire in 1996 may be erroneous due to misidentification. However, it is possible, as Barnard & Ross (2012) mention its presence in Derbyshire, the records could be genuine but without access to archived specimens this cannot be confirmed.

Wormaldia mediana McLachlan: a northern and western species. The NBN Gateway carries a 1980 record attributed to Natural England staff at an unnamed site although the map reference indicates the Wood Brook area. There is no documentary evidence of this record in the VC55 archives and the record must be treated with caution.

It is important that identification of difficult species or those known to be at the edge or outside the normally accepted range of distribution can be verified by reference to voucher specimens. It is not known if the larvae from the Environment Agency water quality surveys were ever archived and the occurrence of some species may never be confirmed. However, records of adults may add some credence to their observations. In the case of larvae originating from the Leicestershire Rivers Project it is thought that archived alcohol-preserved voucher specimens exist within the stores of the Leicester Museum although it is many years since the alcohol collections at the Museum were examined and maintained. This collection is, as yet, unexplored by the author but it is hoped that it may be possible to examine specimens in due course. It is also understood that alcohol-preserved Malaise catches, especially from the Wood Brook project, are also in the same collection. Some of this archived material apparently has never been sorted and may provide additional records for the VC55 database.

Discussion

A handful of species are known only from single larval or adult records in VC55 (Table 2). This may seem surprising as some, such as *L. griseus*, are regarded as being nationally common. It is likely that the disparity is due to discontinuous recording effort in Leicestershire & Rutland rather than absence of any of these species. For instance, Environment Agency monitoring of waterways tended to be no more than

Table 2. Caddis species known only from a single VC55 record of a larva or adult.

Larva only	Adult only
Ceraclea albimacula (6.vi.1997)	*Hydroptila simulans* (3.vii.2014)
Oligotricha striata (1985/86)	*Limnephilus griseus* (15.vii.2013)
	Oxyethira falcata (1.viii.1990)
	Stenophylax vibex (31.ix.1990)

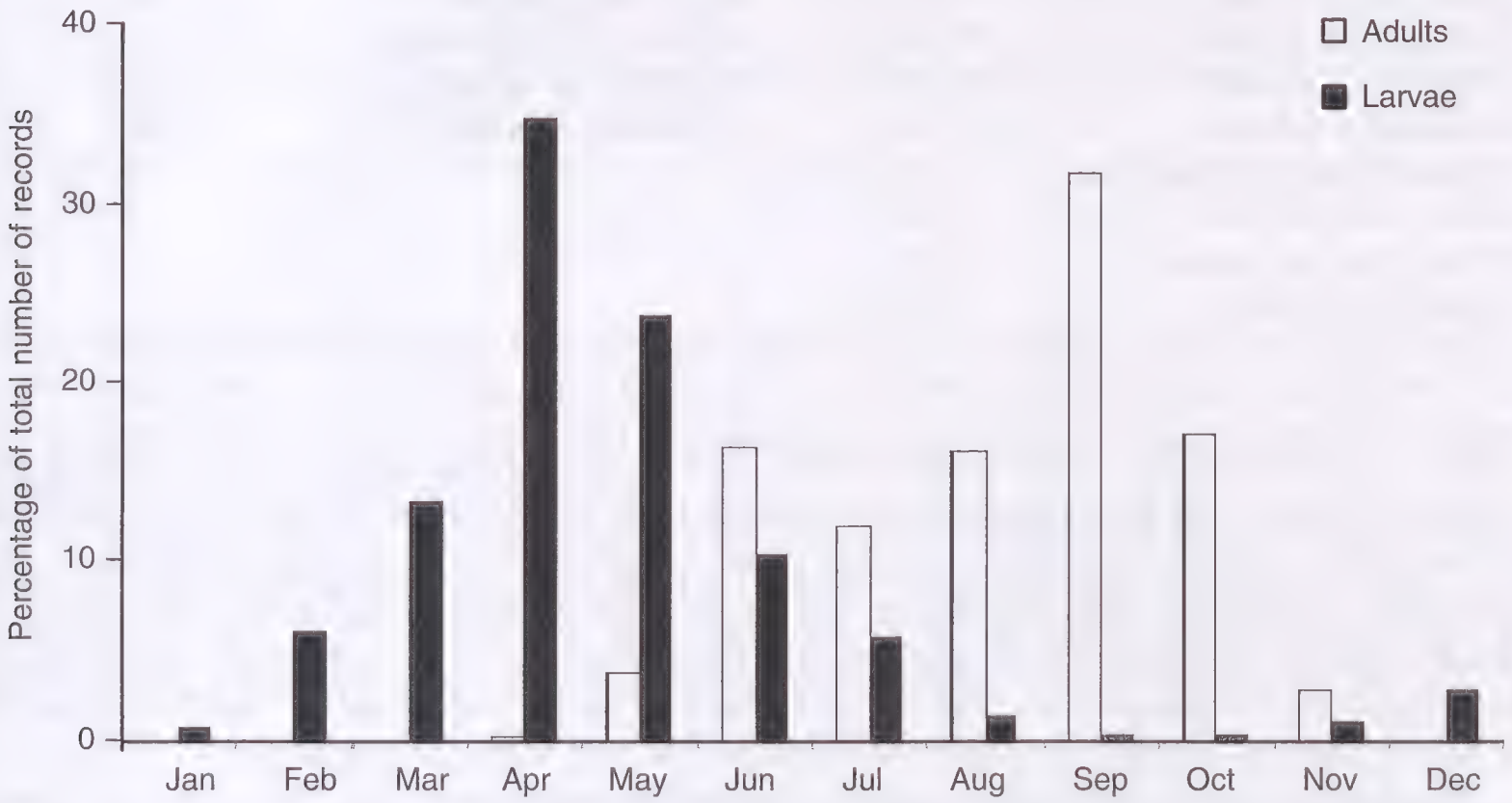


Fig. 1. Appearance of *Limnephilus lunatus* adults (n = 438) and larvae (n = 300) in VC55.

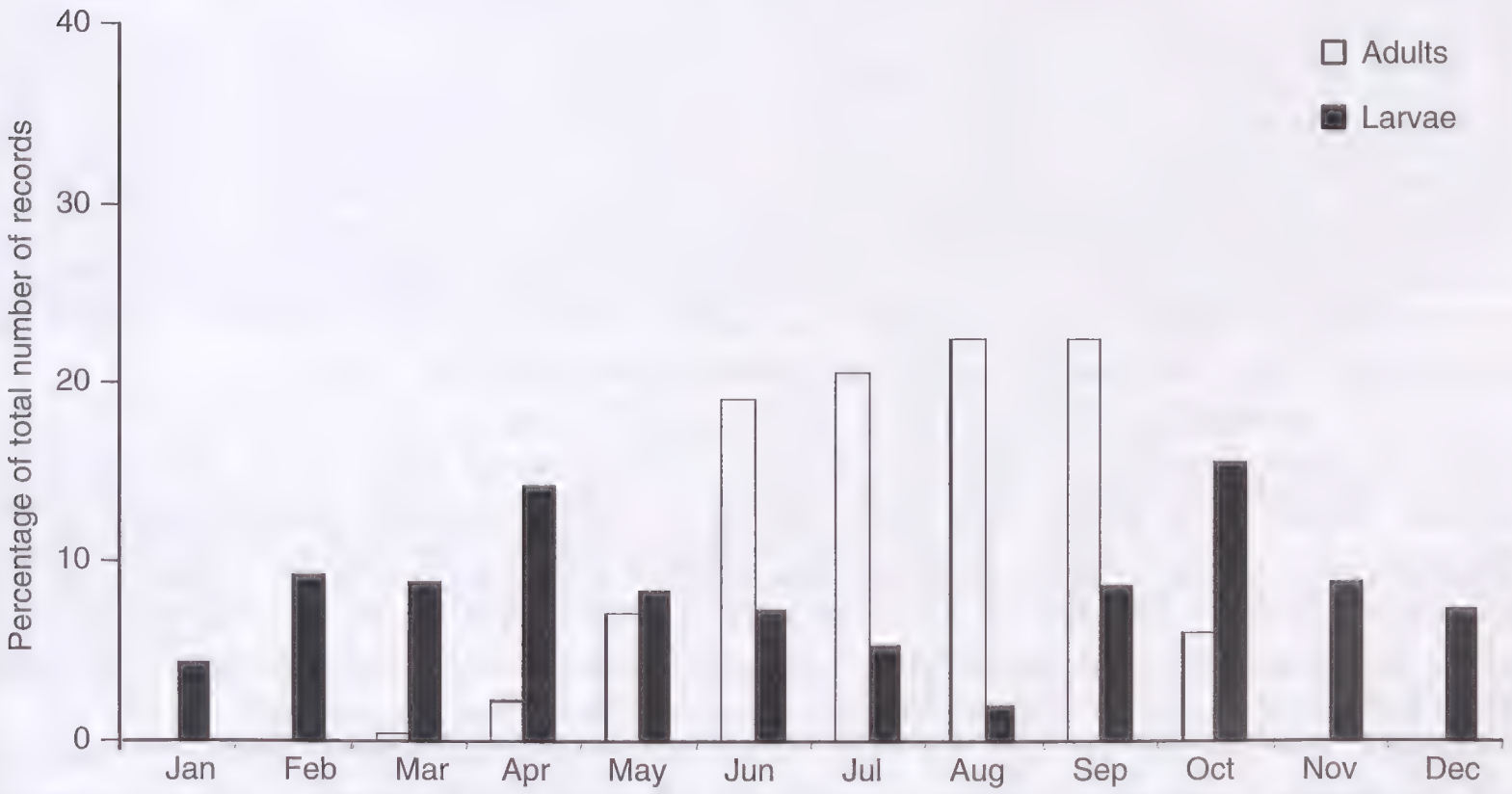


Fig. 2. Appearance of *Tinodes waeneri* adults (n = 268) and larvae (n = 302) in VC55.

one or two visits each year at some sites but at a much higher frequency at others. Other sites were only ever visited once. Similarly, adults caught at moth traps will be influenced by the frequency of trapping at a particular site (garden traps perhaps give slightly better reliability) but also tend to be run when conditions are considered optimum for catching Lepidoptera e.g mid-summer when numbers tend to be high

Table 3. Caddis species with more than 100 records in VC55 up to 2014.

Larval records		Adult records	
Species	Records	Species	Records
Athripsodes aterrimus	223	*Hydroptila vectis*	131
Athripsodes cinereus	137	*Hydropsyche instabilis*	139
Goera pilosa	190	*Limnephilus auricula*	243
Hydropsyche angustipennis	664	*Limnephilus lunatus*	439
Hydropsyche pellucidula	288	*Mystacides azurea*	165
Hydropsyche siltalai	630	*Mystacides longicornis*	175
Lepidostoma hirtum	184	*Rhyacophila dorsalis*	101
Limnephilus lunatus	310	*Triaenodes waeneri*	267
Polycentropus flavomaculatus	123		
Rhyacophila dorsalis	263		
Sericostoma personatum	358		
Triaenodes waeneri	306		

which is often not the case with caddis. The current recording of caddis from the Rutland Water NR Rothamsted trap, which runs most nights of the year regardless of weather conditions, should provide more consistent data on the appearance and longevity of species. The database contains records of both larval and adult stages of caddis species along with a handful of pupal records. The existence of larvae in Leicestershire & Rutland waters is encouraging as regards water quality and the attraction of many species to moth trap lights also helps confirm their occurrence in VC55.

The long-term accumulation of data regarding the occurrence of adult and larval stages of caddisflies allows prediction of when a species may be expected to be encountered in, for instance, a light trap. As examples Figures 1 and 2 show the temporal distribution of the larval and adult records for two common species based on VC55 historical data. Fig. 1 shows that the larvae of *Limnephilus lunatus* tend to be most commonly encountered during the spring months while adults appear from May almost to the end of the year peaking in autumn with no apparent indication of a summer diapause as mentioned by Barnard & Ross (2012). *Tinodes waeneri* (Fig. 2), in contrast, shows perhaps a more expected pattern in that as larval record numbers fall those of adults increase and as adults fall larval records grow in number. There is no suggestion of any diapause or that the species is bivoltine in VC55.

Only 17 caddisflies (Table 3) have been recorded more than a hundred times in VC55 as either larvae (12 taxa) or adults (8 taxa) while more than 500 combined records have been found for four species – *Hydropsyche angustipennis* (708), *Hydropsyche siltalai* (685), *Limnephilus lunatus* (751) and *Tinodes waeneri* (753). Most noticeable is the lack of larval records for some species when adults have been relatively numerous. An example is *Limnephilus auricula*, which is readily found at moth light traps, where 243 of 246 records are of adults.

Overall, six species are known only from larval records with a further 31 known only as adults (Table 4). The recent additions to the VC55 list originating from moth light traps emphasise that it is important to use a variety of collecting methods when trying to establish the status of a group of insects in an area particularly if climatic changes are affecting distribution patterns. The recording of larvae would confirm that such species have established viable breeding populations.

Another factor in determining the true distribution of a species is the dispersal of recording effort. In VC55 many of the adult records come from garden moth traps

Table 4. Caddisflies from VC55 only known from larval or adult records.

Larvae only (n = 6)	*Beraeodes minutus; Ceraclea albimacula; Oligotricha striata; Plectrocnemia geniculata; Potamophylax rotundipennis; Rhyacophila fasciata.*
Adult only (n = 31)	*Agraylea sexmaculata; Agrypnia varia; Ceraclea fulva, Cheumatopsyche lepida; Glossosoma boltoni; Grammotaulius nigropunctata; Hydroptila forcipata; H. martini; H. occulta; H. simulans; H. sparsa; H. tineoides; H. vectis; Limnephilus affinis; L. binotatus; L. griseus; L. hirsutus; L. incisus; L. nigriceps; L. stigma; Oecetis furva; O. lacustris; O ochracea; O. testacea ; Orthotrichia costalis; Oxyethira falcata; O. flavicornis; Stenophylax vibex; Tinodes maclachlani; T. pallidulus; Wormaldia occipitalis.*

predominantly located in the west of Leicestershire. Currently, the majority of caddis adults recorded in the Rutland portion of VC55 come from the Rutland Water NR Rothamsted light trap and scattered occasional light trap sessions at a variety of sites in order to gather lepidopteran data.

The current status of caddisflies in VC55 is that 112 of the 199 British species have been recorded although the number of records for many are relatively low. It is anticipated that with increased monitoring effort throughout Leicestershire & Rutland that a greater understanding of this interesting group will be achieved in VC55.

Acknowledgements

The author is grateful to the Leicestershire & Rutland Environmental Records Centre for access to unpublished records held in the county archives and to the Leicestershire County Collections Resource Centre at Barrow on Soar for access to their extensive entomological library and specimen collections. The encouragement of Malcolm Greenwood and Ian Wallace is appreciated as are the constructive comments by Peter Barnard and John Badmin. Particular thanks go to the many VC55 moth recorders who kindly retain caddis from their catches for identification and special thanks to Peter Barnard for allowing use of his caddisfly images.

References

Barnard, P. & Ross, E. 2012. The adult Trichoptera (Caddisflies) of Britain and Ireland. *RES Handbooks for the Identification of British Insects* **1** (17).

Bell, W. & Bell, T. 1859. Captures near Uppingham. *The Entomologist's Weekly Intelligencer* **6**: 171–172.

Blackburn, J. H. & Forrest, M. B. 1995. New records of *Hydropsyche saxonica* McLachlan (Trichopt., Hydropsychidae) from small streams in Great Britain. *Entomologist's Monthly Magazine* **131**: 71–76.

Bouskell, F. 1907. Insects. *In* W. Page (ed.) (1907). *The Victoria History of the County of Leicester* **1**: 64–95.

Crabbe, G. 1795. The natural history of the Vale of Belvoir. *In*: J. Nichols (ed.) (1795). *The History and Antiquities of the County of Leicester* **1** (1): 191–203.

Douglas, R. N. 1908. Insects. *In*: W. Page (ed.) (1908). *The Victoria History of the County of Rutland* **1**: 38–45.

Evans, I. M. (ed.) 1979. *North-east Leicestershire Coalfield: Report of a Biological Survey 1978*. Leicestershire Museums, Art Galleries & Record Service, Leicestershire County Council.

Fawcett, J. E. 1971. Leicestershire stoneflies. *Transactions of the Leicester Literary & Philosophical Society* **65**: 33–48.

Forrest, M. B., Harper, D. M. & Blackburn, J. H. 1995. A description of larval *Hydropsyche saxonica* McLachlan (Trichoptera, Hydropsychidae). *The Entomologist* **114**: 146–152.

Goddard, D. G. 1985. *Ceraclea senilis* (Burmeister) (Trichopt., Leptoceridae) in Leicestershire. *Entomologist's Monthly Magazine* **121**: 166.

Gray, J. R. A. 1975. Caddis fly records for Leicestershire. *Transactions of the Leicester Literary & Philosophical Society* **69**: 22–27.

Greenway, M. 1970. *The Ecology of a Charnwood Forest Brook*. Undergraduate project report, Dept of Zoology, Reading University.

Greenwood, M. T. & Hobday, C. 1988. The re-discovery of *Tinodes pallidulus* (McL) (Trichopt., Psychomyidae) in Britain. *Entomologist's Monthly Magazine* **124**: 99–102.

Greenwood, M. T., Bickerton, M. A. & Petts, G. E. 2001. Assessing adult Trichoptera communities of small streams: a case study from Charnwood Forest, Leicestershire. *Aquatic Conservation: Marine and Freshwater Systems* **11**: 93–107.

Greenwood, M. T., Agnew, M. D. & Wood, P. J. 2003. The use of caddisfly faunas (Insecta: Trichoptera) to characterise the Late-glacial River Trent, England. *Journal of Quaternary Science* **18**: 645–661.

Harley, J. 1840-1844. *Notes and Observations for the Year 1840 (to 1844)*. Unpublished diaries transcribed by M. B. Withers & R. A. O. Hickling (date unknown), Leicestershire County Resources Centre, Barrow on Soar.

Harper, D. 1983. *The Ecology of Insect Distribution in Leicestershire Streams*. Unpublished project report funded by the Leicestershire Museums Service.

Lott, D. A. 2009. Rare beetles from the lower Soar valley in Leicestershire and Nottinghamshire. *British Journal of Entomology & Natural History* **22**: 217–233.

Loughborough University 1991. *Beacon Hill Catchment Study*. Dept of the Environment contract no Env.PECD/7/10/53.

Macan, T. T. 1973. A key to the adults of the British Trichoptera. *Freshwater Biological Association Scientific Publication* **28**.

Messenger, G 1971. *Flora of Rutland*. Leicester Museums.

Mosely, M. E. 1939. *The British Caddis Flies (Trichoptera)*. George Routledge & Sons Ltd, London.

Morris, R. 2013. Provisional status of Trichoptera (caddis flies) in Leicestershire & Rutland (VC55). *Leicestershire Entomological Society Occasional Publications Series* No 29.

NatureSpot 2009. *http://www.naturespot.org.uk*

Primavesi, A. L. & Evans, P. A. 1988. *Flora of Leicestershire*. Leicestershire Museums, Art Galleries and Records Service.

Robson, G. 1879. The predaceous water beetles (Hydradephaga) of Leicestershire. *The Midland Naturalist* **2**: 57–60.

Shelton, P. M. J. 2007. *Priory Waster Wildfowl Project: the establishment and development of a nature reserve*. The Leicestershire Wildfowlers' Association.

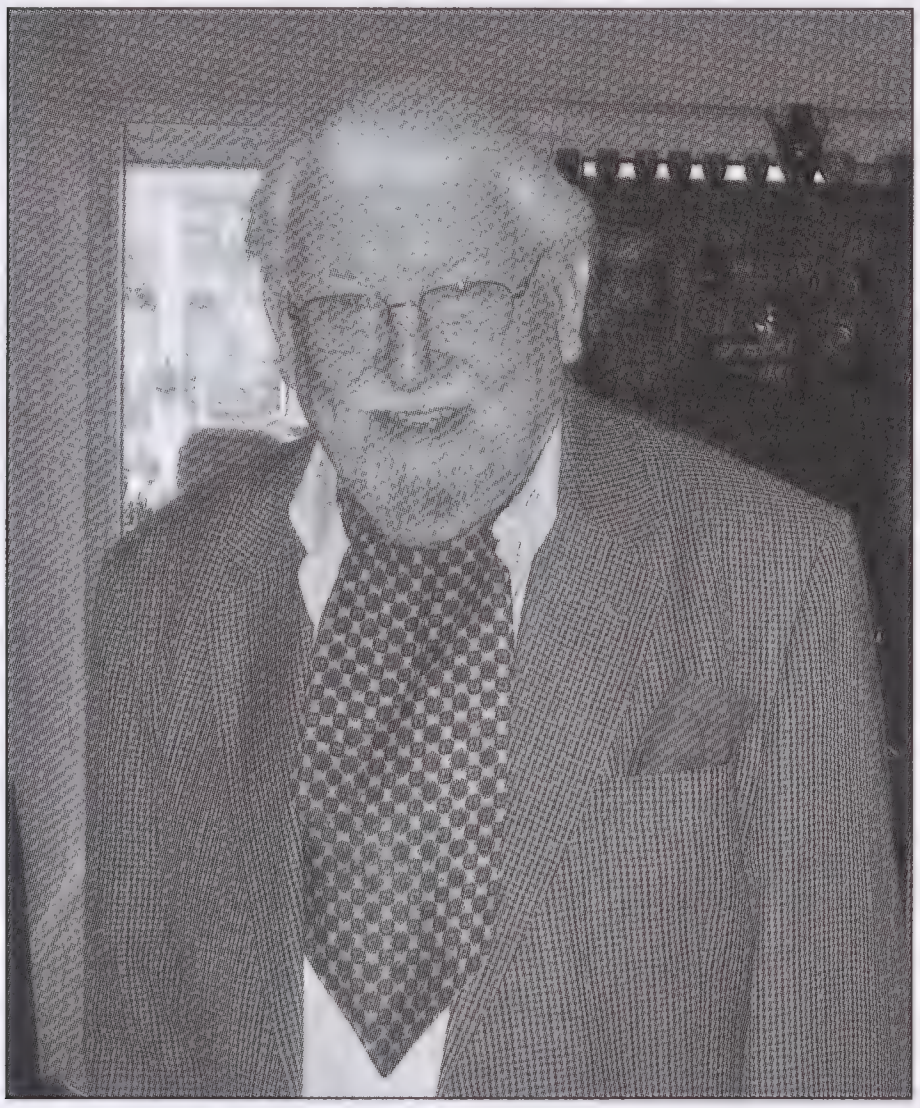
Spooner, G. M. 1946. Hymenoptera aculeata from Charnwood Forest, Leicestershire. *Entomologist's Monthly Magazine* **82**: 25–29.

Tindall, A. R. 1960. The larval case of *Triaenodes bicolor* Curtis (Trichoptera: Leptoceridae). *Proceedings of the Royal Entomological Society, London (A)* **35**: 93–96.

Tobias, W. & Tobias, D. 2008. *http://trichoptera.insects-online.de/Trichoptera%20fennoscandinavica-aktuell/index.htm*

OBITUARY

THOMAS GRAHAM HOWARTH MBE FRES
15th February 1916–8th April 2015



Graham at ninety

When Graham slipped away after a short illness, it was in many ways the severing of a link to a way of life and a time in entomology now gone forever. I had the privilege of getting to know Graham well in the last twenty years of his life. Before that I had met him occasionally, often at the home of Don Russwurm in Brockenhurst. By this time his career as a professional entomologist was over, not to mention his exploits in the Second World War. Over the course of many evenings sitting round a table in his local pub, or more latterly enjoying his favourite fish and chips at home in Ferndown, I feel I came to know something of his past.

Graham was born on the 15th February 1916 in Mill Hill, North London and spent his childhood in Muswell Hill, then a leafy suburb, where he became fascinated with the wildlife he encountered from an early age. He recalled finding a Lime Hawk moth caterpillar as a really young child and was hooked for the rest of his life. This interest was fuelled on holidays to visit his grandfather, Harry Chapman, and his uncle who lived in the Brandon area of Suffolk. Here he learned about the iconic species of that area, the Stone Curlew, Marsh Harrier and Bittern, the Grey Carpet Moth and the Viper's Bugloss. He learned to fish in the streams and rivers and went bird nesting in the hedgerows with his cousins. Graham liked to recall sitting on a wall above a Buddleja bush to watch the butterflies as a very young boy; on one occasion catching a Camberwell Beauty to the delight of his relatives.

Graham (centre) learning to fish with his family at Brandon in 1922

Back home his schooling at Tollington Secondary School came to an end. He won prizes for art and natural history. He was a gifted artist as a young man and I have a little sketchbook in which are splendid watercolours of the British Hawk moths and their larvae, painted, I think, when he had just entered his teens. Later he illustrated the diary he kept as a POW with many drawings of the insects he saw. He was introduced, aged fourteen, to the librarian of the South London Entomological Society, A. W. Dods, and in 1931 became the youngest ever member of our Society. He was still a member 84 years later! He came to the notice of two well-known entomologists, Bernard Kettlewell and Dr Edward Cockayne and they took him under their wing and became the young Graham's mentors. Through Cockayne's help he joined the Entomology Department of the British Museum (Natural History) in 1936.

After a brief spell in the "Setting Room" he became an assistant in the Butterfly section. Until the very end of his life Graham could regale us with tales of the, often well known, people he met in the museum and collected insects with in the field, including Brigadier W. H. Evans, H. M. Edelsten and Norman Riley. He had an eye for detail, and could bring personality to life with his descriptions of a tilted head or a drawn cigarette. His remembrance for detail with which to embellish his, often scurrilous, tales of the entomologists he had met and worked with was phenomenal. He was proud to be elected a Fellow of the Royal Entomological Society in March 1939 and kept his letter from the Secretary.

It wasn't all entomology; for a short time Graham flirted with dance music and played the drums in a small swing band. A splendid picture exists of Graham with the drum sticks held in his mouth, looking like a Walrus! I gained the impression that the young Graham enjoyed life in pre-war London to the full.

War came, and he and his best friend Eric Classey, who would go on to become an entomological publisher of great repute, enlisted in the Army Medical Corps together. He did sterling work in the Blitz and initiated a rescue when his Regimental Medical Post suffered a direct hit from a high explosive bomb in November 1940. He

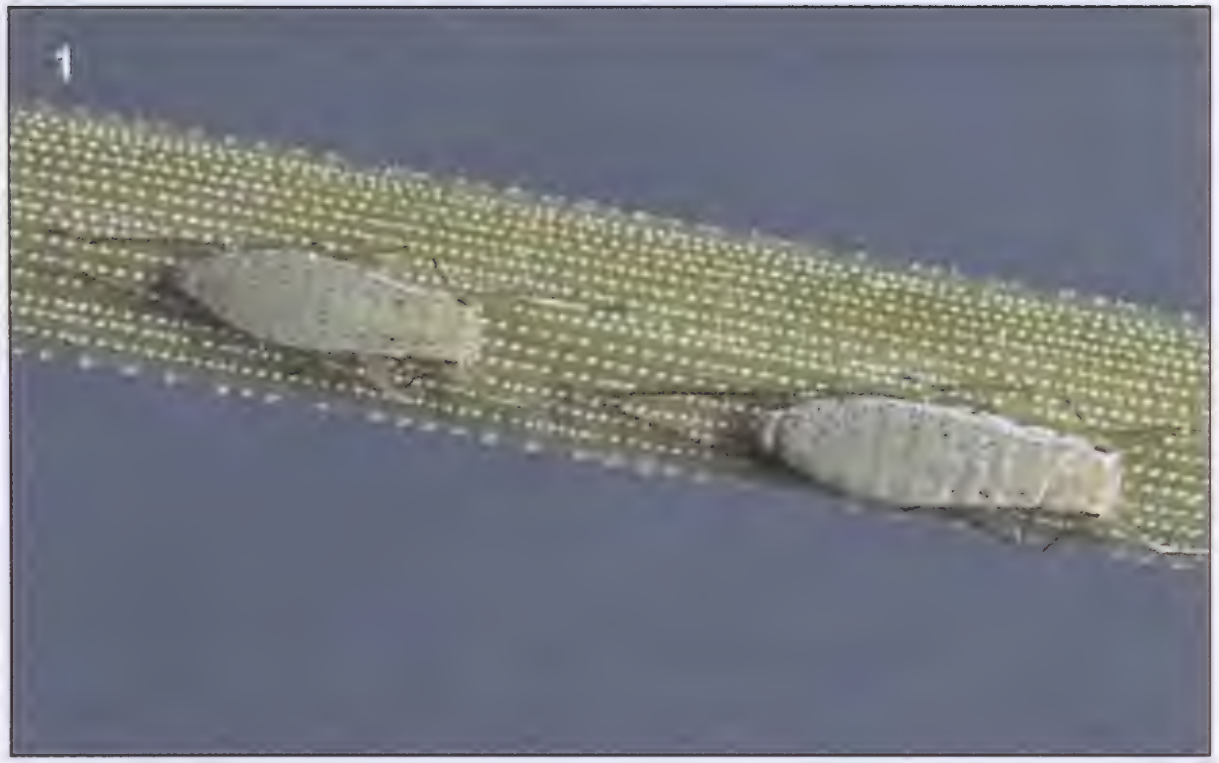


PLATE 9. Fig. 1. Nymph (L) and adult (R) of *Essigella californica* (c. 2 mm) on *P. montezumae*. Fig. 2. *Myrmica* ant attending the aphid *Eulachnus rileyi* (c. 2.4 mm) on *Pinus montezumae*. Fig. 3. Parasitized mummy of *Essigella/Eulachnus* on *P. montezumae.* Photos copyright InfluentialPoints, all rights reserved. Fig. 4. Adult *Japananus hyalinus*, (c. 5 mm) Cambridge, 9.viii.2015. Photo: K. Edkins.

Plate 10, Fig. 1. Characteristic feeding damage caused by *Coleophora galbulipennella* (larval case 11 mm) on *Silene nutans*, Dungeness, Kent. Photo: J. Badmin. Fig. 2. The Birch Sawfly *Cimbex femoratus* (25 mm long). Photo: B. Lehrmann. Fig. 3. *Meloe proscarabaeus* female (30 mm), Reculver, Kent, 2014. Photo: Sue Healey. Fig. 4. *Meloe brevicollis* (22 mm), Allington Farm, Porton Down, Hampshire, 2015. Photo: J. Denton.

PLATE 11. Figs. 1–4. Caddisflies recorded in Leicestershire and Rutland (VC 55). Fig. 1. *Tinodes waeneri* (Psychomyiidae). Fig. 2 *Hydropsyche siltalai* (Hydropsychidae). Fig. 3. *Lepidostoma hirtum* (Lepidostomatidae). Fig. 4. *Halesus radiatus* (Limnephilidae). Photos: P. Barnard.

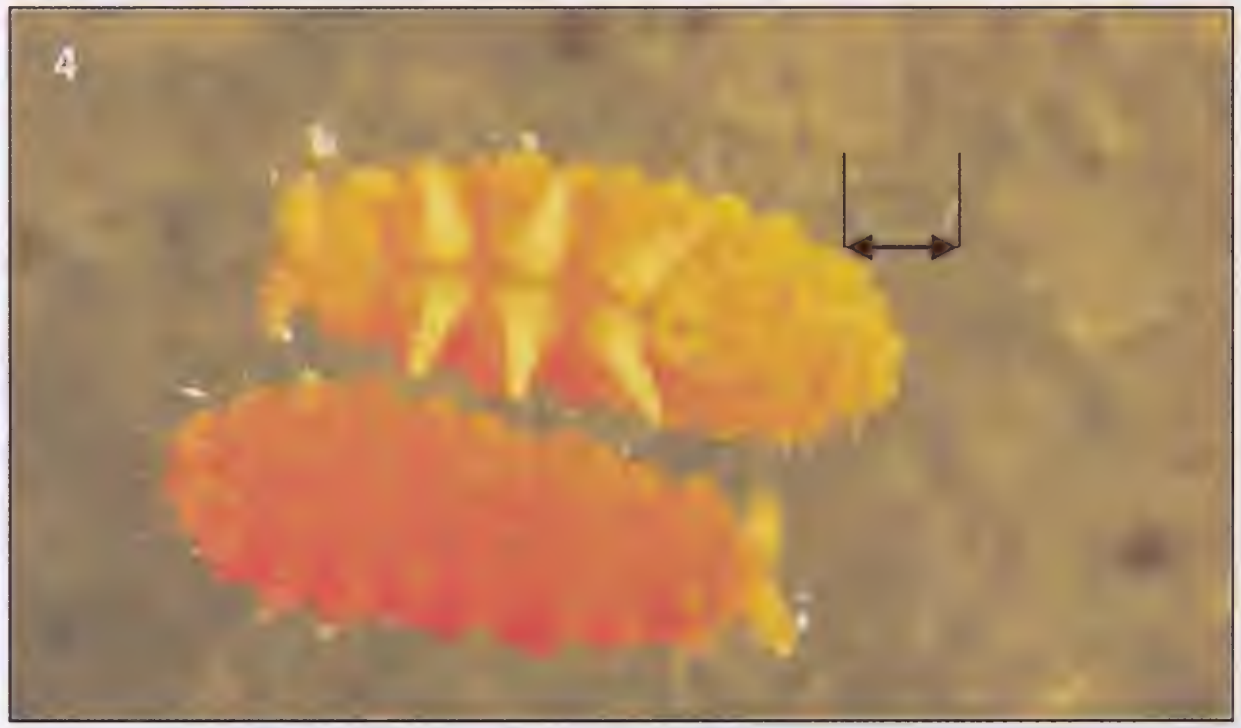
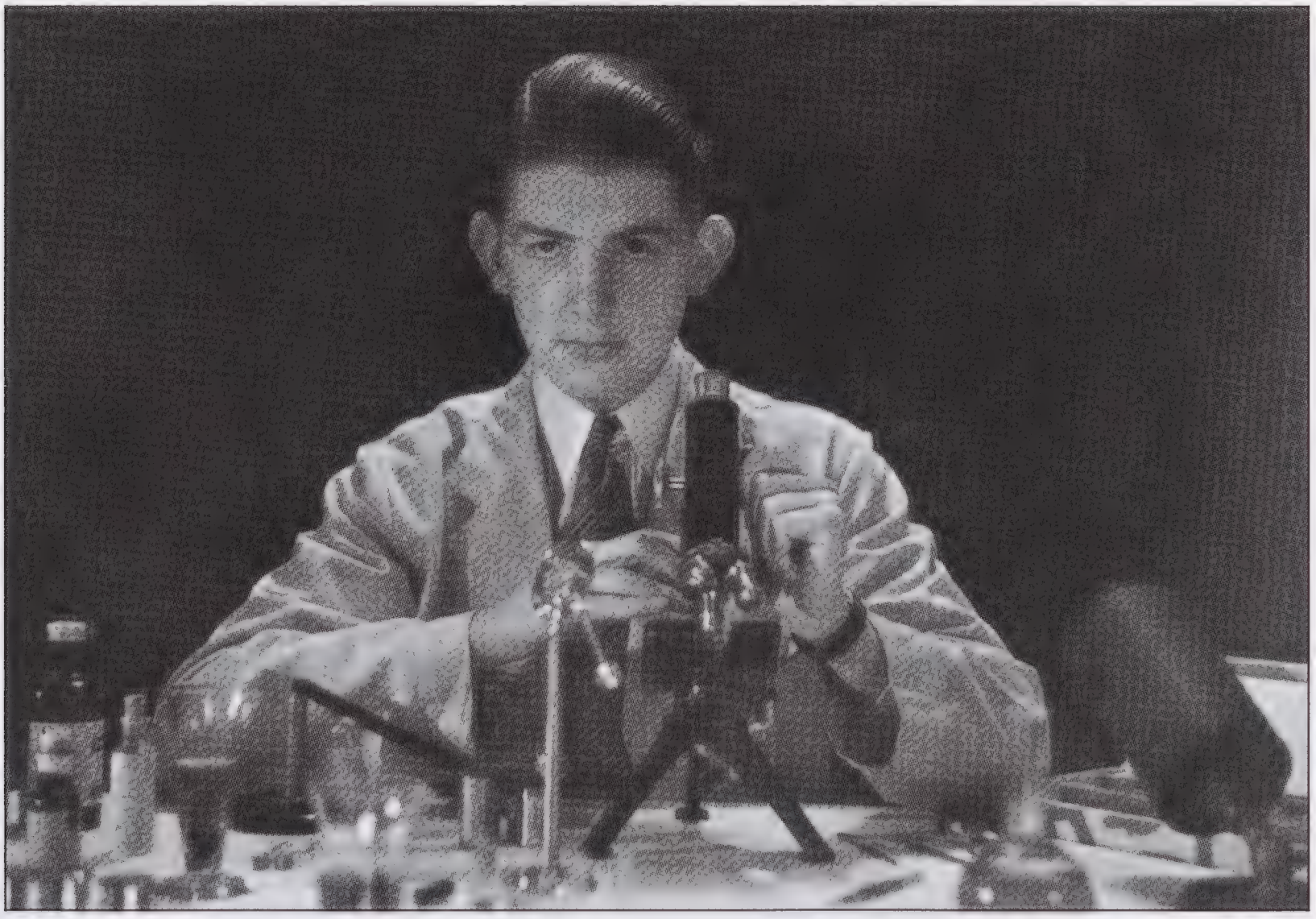


PLATE 12. Figs 1 & 2. Caddisflies recorded in Leicestershire and Rutland (VC 55). Fig. 1. *Stenophylax permistus* (Limnephilidae) wingspan c. 45 mm. Fig. 2. *Athripsodes cinereus* (Leptoceridae) wingspan c. 22 mm. Photos: P. Barnard. Fig. 3. The springtail *Bilobella braunerae* from Church Farm Shropshire, UK, January 2015. Photo: Peter Boardman. Fig. 4. *Bilobella braunerae* from Church Farm Shropshire, stored in alcohol. The glass beads in the background are 250µm diameter (one is shown arrowed) so each animal is about 1.5 mm long. The body colour has started to change in the alcohol, and is much pinker in life. Photo: Peter Shaw.



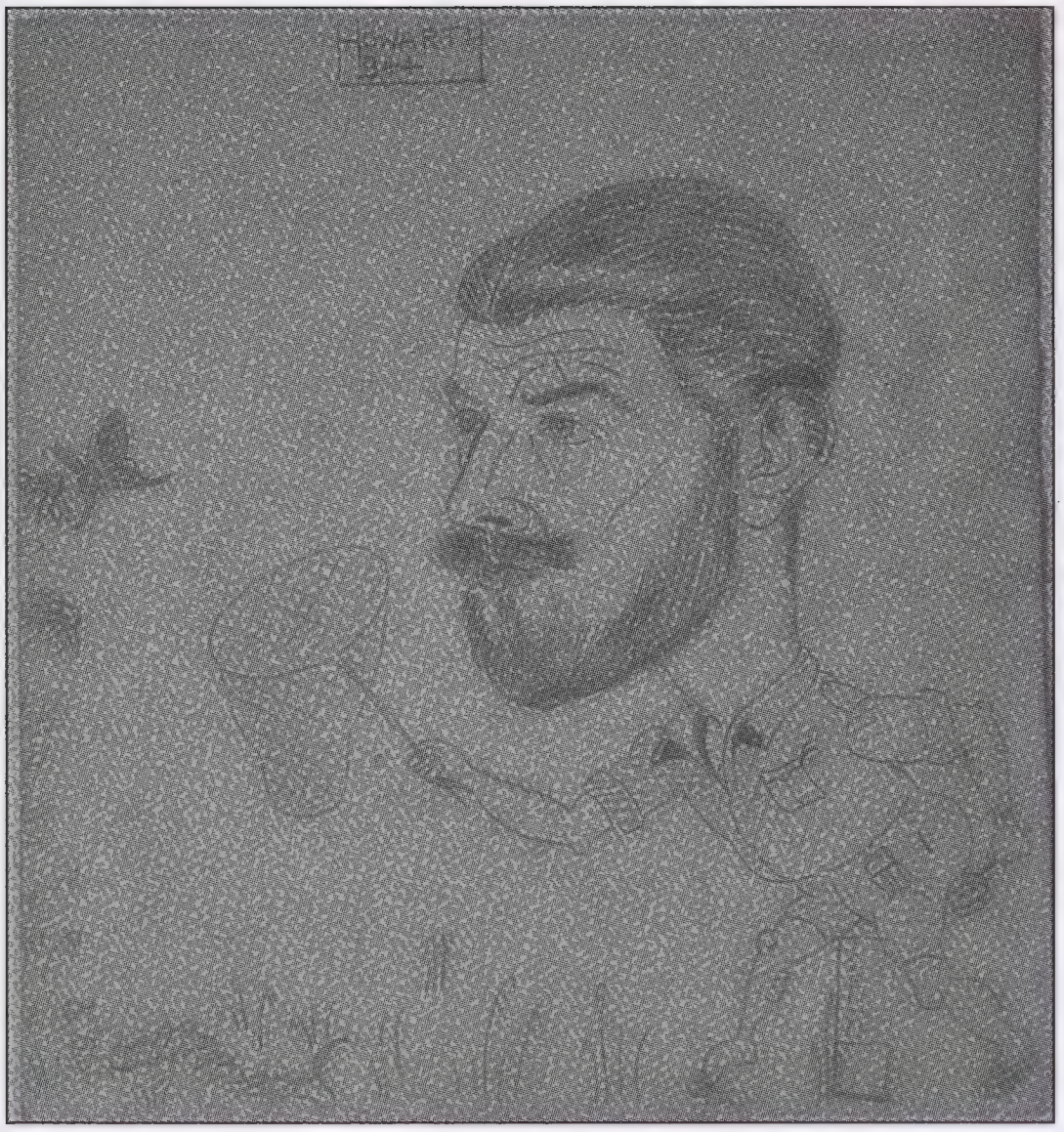
Starting at the Museum

was awarded the Medal of the Military Division of the Most Excellent Order of the British Empire. Part of the citation reads "Private Howarth, throughout this affair, showed great courage and initiative and a complete disregard for his own safety". There is a letter from this Society's Honorary Secretary expressing 'our' pride in his action. Graham was posted to Singapore and was soon involved in anti-malarial work. His travels in search of breeding sites for *Anopheles* gave him an opportunity for investigating butterflies and moths as well. Perhaps a couple of quotes from his later writings about this time will illustrate the sense of humour that stayed with him to the end of his life.

"There are times when the more self-conscious of us feel uncomfortable when, armed with entomological paraphernalia, we are confronted by the public; I was never more so than when I encountered the enemy, armed only with a tin helmet and a larval scoop!" and "my (entomological) collection and gear was dispersed by a shell, fortunately a small one, but I managed to salvage and amalgamate it again".

On his twenty-sixth birthday, came, in Churchill's words, "the worst disaster and largest capitulation in British Military History" as British troops surrendered to the Japanese. Shortly before his death Graham told me that, standing on the steps of the Raffles Hotel that day, watching the surrender, was the second worst day of his life. His internment began in the notorious Changi Jail outside Singapore, but he was transferred to Jinsen Camp in Seoul, Korea.

He spent most of the rest of the war in forced labour, working on the construction of a massive dock for the Japanese and later, when transferred to Konan, in a carbide works. It was only in the last few years of Graham's life that he talked about his wartime experiences and told me of the horrendous sea voyage from Singapore on the Fukai Maru, the long train journey across Korea with hardly any food and



Self portrait at Jinsen

the final forced march around Seoul. No doubt he survived because the conditions in Korea were marginally better than further south; bitter cold replaced intolerable heat, but there was less disease and more Red Cross access. A pamphlet for a Christmas 1944 camp entertainment survives and Graham features prominently, acting, singing and playing the sardine tins!

Graham made the most of his imprisonment! Allowed out from time to time to forage for food to augment the meagre rice ration, he collected not only grubs for the pot, but insects for his collection. He was eventually able to bring some 1,500 specimens back to the B.M. including a noctuid moth new to science and some that were very rare. He recorded these years in his paper "Prison Camp Entomology in the Far East" (Howarth, 1945). His entomological diary from that time, complete with Japanese censors stamps, forms part of his archive bequeathed to the British Entomological and Natural History Society, as does the self-portrait cartoon above.

He was moved north to Konan (Hungnam) POW camp, some 300 miles south of Vladivostok, where after the war ended came release by the Russians and eventual repatriation by the Americans. The dramatic story of the B29 "Hog Wild" forced down next to the camp, and particularly the red parachute silk from American humanitarian food drops in which local children were soon clothed, was one of his favourites tales. He crossed the Pacific on an aircraft carrier and the USA on a train, arriving home on the RMS Queen Mary at the height of the 1945 winter to start another chapter of his life.

Back in the Natural History Museum, Graham resumed his old life in the Butterfly section. He worked primarily on Far Eastern butterflies, but he often answered visitors' queries and thus became known to many aspiring entomologists. He became

Sporting the Society tie at the Museum

President of the British Entomological Society (1951) and served on the Council of the Royal Entomological Society (1956–1958). He travelled to Europe and collected in the Alps at a time when such endeavours were still unusual and recounted his experiences in his Presidential address to our Society. We find him participating in the revolution wrought by the Robinson trap in the early 1950s, visiting Freshwater for Blair's Wainscot and breeding scarce migrant moths.

A chance encounter in Lyons Corner House, where he was asked to share a table, brought him to Helen (Miriam Helen Wayman), who became the love of his life. They were married in September 1952. The happy couple removed to Arkley in Hertfordshire, and enjoyed the boom of the fifties and sixties with Continental travel and entertaining at home.

Picture the dapper Graham striding to the Museum each day, bowler hat at a jaunty angle, briefcase in hand. It was during this time that he wrote the standard textbook on British Butterflies (1973) and many scientific papers and articles. He mentored and launched the entomological careers of many, and hospitality to entomologists was always offered at Arkley.

One of the most attractive features of Graham was his lack of rancour against the Japanese. By chance he became an expert on Japanese butterflies, describing a number of species and a genus new to science. He and Helen had the chance to visit Japan in the early 1970s and were treated with great respect. He was made an Honorary Life member of the Japanese Lepidopterological Society and the hairstreak butterfly genus *Howarthia* was named after him. Friendships with Japanese entomologists including Hisakasi Hayashi and Suguru Igarashi made at that time would last for the rest of their lives.

Helen and Graham with Hisakasi Hayashi and Suguru Igarashi in Japan

In 1976, also on his birthday, came, in his words, "the worst day of my life". He had hoped for, and been promised, an extension to his working life, but as a Civil Servant he had to retire from the job he loved so much. Another chapter opened; this time retirement and a move to Beer in Devon. Lots more travel, writing and involvement with conservation projects, including the one to save the Large Blue butterfly. He enjoyed a voluminous entomological correspondence and continued to contribute to many books and papers.

In 1988 he and Helen moved to Ferndown in Dorset and at first enjoyed many happy times getting to know their neighbours, gardening and taking their little dog for walks. When Helen died in 1996 Graham was bereft. He found what solace he could in developing his stamp collection, listening to classical music and enjoying the continuing friendship of many. He supported many charities generously. Graham was thrilled to be interviewed by the Natural History Museum about his early recollections of the Entomology Department and the results of those interviews can be seen on the Museum's website. In the final chapter of his life, and with the special help of his friends and neighbours Graham kept his independence and a clear mind. The last proper conversation I had with him just a few weeks before his death, was on the comparative merits of Wallace and Darwin. (He was clearly a Wallace man!)

This society has much to thank him for. He was President in 1951 exactly 50 years before his last visit to the Annual Exhibition and he served in a number of capacities; remaining on the editorial committee until his death. While Graham and Helen lived in Hertfordshire they were both staunch supporters of the Society's meetings. Helen liked to be involved with organising tea and biscuits and the refreshments at the Exhibition. I recall the first time I met Helen, at the Chelsea Town Hall, when she served me a sandwich. They were unable to make the trek to London so often once they had retired to Devon, but still liked to be as involved as possible. When Graham heard that the Society was trying to acquire a third room at Dinton Pastures he immediately provided a large proportion of the funds necessary and additionally his generous bequest ensures that 'the Helen and Graham Howarth Room' is aptly named. The day in 2012 when he opened the room brought him much happiness.

His collection of Lepidoptera was dispersed in the 1980s, but he has left the Society his collection of separata, the copy of "*A General Textbook of Entomology*" by A. D. Imms which accompanied him throughout the war, and his war diary. These items will be incorporated in the Malcolm Simpson Collection of Entomological Memorabilia at Dinton Pastures. The other item to be included here needs some explanation. Helen loved to entertain and also loved needlework. She combined these interests by inviting visitors to sign one of two circular tablecloths and then embroidering the signature. Entomologists' names are marked with a red dot and form a unique record.

In his final years Graham, who had no close family left, continued to enjoy the company of entomological friends. He never missed a get together if bugs were involved and liked to keep newspaper cuttings of entomological interest for his many visitors. Graham's penchant for uninterruptible monologues could be off-putting for the unwary, but his unfailing good humour and self-deprecation, his old world manners and charm, his kindness and generosity were beguiling qualities. I have been touched by the many letters of tribute I have received from all over the world from those I have informed of his passing. Graham's life touched and influenced so many others that we have reason to be thankful he inhabited this world.

TONY PICKLES

T. G. Howarth: Bibliography 1948–2000

Books

1973. *South's British Butterflies*. Frederick Warne, London & New York.
1973. *Colour Identification Guide to British Butterflies*. Frederick Warne, London & New York.
1984. *Colour Identification Guide to British Butterflies*. Penguin Books, Middlesex, England, Revised Edition.

Papers

1948. The Siesta of *Macroglossum stellatarum*. *Entomologist* **81**: 126.
1950. Notes on *Catocala fraxini* (L.) – a British residential species. *Entomologist's Gazette* **1**: 41–44.
1950. Notes of the life-history of *Margaronia unionalis* Hbn. *Entomologist's Gazette* **1**: 85–88.
1951. Prison Camp Entomology in the Far East 1941–45. *Proceedings of the South London Entomological and Natural History Society* 94–110.
1952–53. Collecting Lepidoptera in the South of France in 1950 and 1951. Presidential Address. *Proceedings of the South London Entomological and Natural History Society* 52–65.
1956. A new species of butterfly of the genus *Niphanda (Le. Lycaenidae)* from Malaya. *Entomologist* **89**: 161–162.
1957. Macrolepidoptera in the Spring. *Bulletin of the Amateur Entomologists' Society* **16**: 25–30.
1957. *Diestogyna butleri* Aurivillius (Lep. Nymphalidae) and corrections to an earlier paper. *Proceedings of the Royal Entomological Society, London* (B) **26**: 99–102.
1957. A revision of the genus *Neozephyrus* Sibatani & Ito (Lepidoptera: Lycaenidae). *Bulletin of the British Museum Natural History* **5**: 233–272.
1959. A new species of *Diestogyna* Karsch (Lepidoptera: Nymphalidae) from Nigeria *Proceedings of the Royal Entomological Society, London* (B) **28**: 132–133.
1959. A description of a new race of *Acraea cerasa* Hewitson (Lepidoptera, Nymphalidae) with some notes on related species. *Entomologist*. **92**: 133–136.
1960. Notes on the larval ecdysis of *Stauropus fagi* (Lep. Notodontidae). *Entomologist's Gazette* **11**: 24–27.
1960. Two examples of protective resemblance in Lepidoptera. *Entomologist's Gazette* **11**: 148.
1960. Further notes on *Acraea cerasa* Hewitson (Lepidoptera Nymphalidae) and come corrections to a previous paper. *Entomologist* **93**: 184–185.
1961. Review: *'The Moths of the British Isles'* by R. South. *Ann. Mag. Nat. Hist.* **13**(4): 511–512.
1961. Review: *'Butterflies'* by Arthur Smith. *Entomologist's Gazette* **12**: 197.
1961. Review: *'Common Malayan Butterflies'* by R. Morrell. *Entomologist's Gazette*. **12**: 51.
1961. *Astiphromona strenuous* Holmyr. – a hyperparasite of *Minucia lunaris* Schiff. *Entomologist's Gazette* **12**: 3.
1962. The Rhopalocera of Rennell and Bellona Islands. *Nat. Hist. Rennell Is. Brit. Sol. Is.* **4**(37): 63–83.
1963. The butterflies of the Windward Islands. *Windward Island Annual:* 50–53.
1964. Review: *'A synonymic list of Neartic Rhopalocera'* by C. F. dos Passos. *Entomologist's Record & Journal of Variation* **76**: 176.
1966. Review: *'A list of the butterflies of Malawi'* by D. Gifford. *Entomologist's Gazette* **17**: 93–94.
1966. [with J. Herrera]. Genitalia de los tipos de Satyridae de Chile desitados en el British Museum. *Publnes. Cent. Estud. Ent. Univ. Chile* **8**: 73–126.
1966. Revisional notes on the genus *Antanartia* (Lep. Nymphalidae). *Bulletin of the British Museum Natural History* **18**: 23–43.
1967. Expensive Butterflies. *Animals (July)*: 141.
1968. *Nymphalis antiopa* (L.) in Oxford. *Proceedings of the British Entomological and Natural History Society* **1**: 112.
1968. [with Richard M. Fox]. Contribution à la faune du Congo (Brassaville). Mission A. Villiers et A. Descarpentries. LXVIII. *Lépidoptères Nymphalidae, Danaidae* et *Riodinidae*. *Bull. Inst. Fond. Afr. noire* **30**: 1236–1280 (sep.1240).
1969. [with E.J. Nieuwenhuius]. On some butterflies from the Indo-Pacific region. *Ent. Ber. Amst.* **29**: 85–88.
1969. The correct names for the African Blue Pansy (*Junonia oenone* L.) and the African and Oriental Yellow Pansy (*Junonia hierta* Fabricius) butterflies (Lepidoptera: Nymphalidae). *Entomologist's Record & Journal of Variation* **81**: 294–295.

1969. Some African Nymphalidae (Lepidoptera). *Proceedings of the Royal Entomological Society, London* (B) **38**: 11–12: 141–156.
1970. An Asiatic butterfly at liberty in England. *Entomologist's Record and Journal of Variation* **82**: 13—14.
1971. Descriptions of a new British subspecies of *Parage aegeria* (L.) (Lep. Satyridae) and an aberration of *Cupido minimus* (Fuessly) (Lep. Lycaenidae). *Entomologist's Gazette* **22**: 117–118.
1971. The status of Irish *Hipparchia semele* (L.) (Lep. Satyridae) with descriptions of a new subspecies and aberrations. *Entomologist's Gazette* **22**: 123–129.
1973. [with D. Povolony]. Bietrage zur Kenntnis der Fauna Afghanistans. *Cas. Morav. Mus. Brno*. **58**: 131–158. Rhopalocera, Lepidoptera Pt. 1.
1973. Review: '*The World of Butterflies*' by Dickens, M. & Storey, E. *Entomologist's Gazette*. **24**: 213.
1973. The conservation of the Large Blue butterfly (*Maculinea arion* L.) in West Devon and Cornwall. *Proceedings & Transactions of the British Entomological & Natural History Society* **5**: 121–126.
1974. [with M. W. F. Tweedie]. Ultraviolet Butterflies. *Animals (Jan.)*: 31–33.
1974. Review: *'Tropical Butterflies'* by D. F. Owen. *Entomologist's Gazette* **22**: 174.
1974. On Conservation of the Large Blue in Britain. *Yadoriga* **77**: 20–22. (In Japanese with letter of thanks).
1974. [with T. Racheli]. Some observations on *Pachliopta polydorus* (Linnaeus) (Lepidoptera: Papilionidae) from the Solomon Islands. *Tyo-To Ga (Trans. Lep. Soc. Jap.)* **26**: 8–13.
1976. Review: '*A field guide to the butterflies of the West Indies*' by N. D. Riley. *Entomologist's Gazette* **27**: 171–172.
Notes on the biology of *Lamproptera curius walkeri* Moore (Lep. Papilionidae). *Journal of Research on Lepidoptera* **15**: 27–32.
1976. [with D. Povolony]. Bietrage zur Kenntnis der Fauna Afghanistans. *Cas. morav. Mus. Brno*. **61**: 139–170. Rhopalocera, Lepidoptera Pt. 2.
1976. [with A. Kawazoè and A. Sibatani]. A new mimetic species of *Danaus (Tirumala)* from the Solomon Islands (Lepidoptera: Danaidae). *Transactions of the Lepidoptera Society of Japan* **27**: 131–137.
1977. A list of the type specimens of *Ornithoptera* (Lepidoptera: Papilionidae) in the British Museum (Natural History). *Bulletin of the British Museum Natural History* (*Entomology*) **36**: 153–169.
1977. A remarkable aberration of *Gonepteryx cleopatra* (L.) (Lep. Pieridae) from Malta. *Entomologist's Record and Journal of Variation* **99**: 72.
1977–78. Foreword to *'A Monograph of the Birdwing Butterflies'* by J. Haugum and A. M. Low. Vol.1 part 1. *Scandinavian Sci. Press* (p.11) Denmark.
1977. [with J. Plantrou]. Notes on *Charaxes eudoxus* (Lepidoptera:Nymphalidae) and a description of a new subspecies. *Proceedings of the British Entomological and Natural History Society* **10**: 22–25.
1979. Obituary – 'N.D.R.' – Norman Denbigh Riley, C.B.E. 1890–1979. *Antenna* **3**: 130–132.
1979–80. Obituary with Bibliography – N. D. Riley, C.B.E. *Proceedings of the British Entomology and Natural History Society* **12**(3-4): 103–112 & **13**(1): 39–40.
1983. The recently discovered female of *Chrysozephyrus disparatus interpositus* (Lepidoptera: Lycaenidae). *Tyo-To Ga (Trans. Lep. Soc. Jap.)* **34**: 37–39.
2000. Foreword to '*Variation in British Butterflies*' by A. S. Harmer. Paphia Publishing Ltd. Hants. England pp. 1–293.

References

Wilkinson, J. *Sketches of a P. O. W. in Korea*. Wilke and Co., Melbourne. 1945.

Internet Resources

Natural History Museum: Museum Lives.
Jinsen and Konan POW camps, Korea

Taxa Described by T. Graham Howarth

Acraea ansorgei f. *elgonensis*
Acraea ansorgei f. *jacksoni*
Acraea ansorgei f. *gabrieli*
Acraea ansorgei acuta f. *flava*
Acraea ansorgei acuta f. *alba*
Acraea ansorgei acuta f. *rubrobasalis*
Acraea ansorgei acuta f. *chrysippina*
Acraea ansorgei acuta f. *handmani*
Acraea ansorgei acuta f. *cottrelli*
Acraea ansorgei acuta f. *australis*
Acraea ansorgei acuta f. *reducta*
Acraea ansorgei acuta f. *radiata*
Acraea cerasa kigezia
Antanartia schaenia dubia
Antanartia abyssinica jacksoni
Antanartia abyssinica vansomerni
Antanartia dimorphica dimorphica
Antanartia dimorphica aethiopica
Antanartia dimorphica comoroica
Antanartia dimorphica mortoni
Apatele cerasi
Atrophaneura latreillii afghana
Austrozephyrus
Catochrysops panormus rennellensis
Catochrysops amasea reducta
Catopyrops kura reducta
Cepora perimale radiata
Charaxes fournieriae kigeziensis
Cupido minimus multistriata
Cymothoe fumana balluca
Danaus philene albonotata
Diestogyna butleri kiouensis
Diestogyna ituriensis
Distogyna pavo
Doleschaelia bisaltide rennellonsis
Euploea fraudulenta addenda
Euploea nemertes bellona
Euphaedra neophron rydoni
Euxanthe eurinome f. *johnsoni*
Hipparchia semele hibernica
Hipparchia semele hibernica f. *pupilinea*
Hipparchia semele hibernica f. *decolorata*
Hypolimnas antilope albomela
Hypolimnas pithoeka bradleyi
Hypolimnas pithoeka ferruginea
Hypolimnas alimena libatela
Hypolimnas alimena diffusa
Neozephyrus sikkimensis
Neozephyrus nigroapicalis
Neozephyrus kabrua
Neozephyrus marginatus
Neozephyrus tytleri
Neozephyrus sandersi
Neozephyrus yunnanensis
Neozephyrus souleana angustimargo
Neozephyrus chinensis
Neozephyrus disparatus
Neozephyrus disparatus pseudotaiwanus
Neozephyrus disparatus pseudoletha
Neozephyrus disparatus interpositus
Neozephyrus helenae
Neozephyrus helenae f. *violescens*
Neozephyrus bhutanensis
Niphanda stubbsi
Parage aegeria insula
Phalantha alcippe rennellensis
Phalantha alcippe bellona
Precis hedonia parvipuncta

Taxa named after T. G. Howarth

Genera

Howarthia sibatani Shirôzu & Yamamoto, 1956

Species

Aporia howarthi Bernardi, 1961
Apaustus howarthi Wright, 1973
Lindra howarthi Mielke, 1978
Notocrypta howarthi Hayashi, 1980
Bicyclus howarthi Condamin, 1976
Euptychia howarthi Hayward, 1962
Charaxes howarthi Minig, 1976
Paralasa howarthi Sakai, 1978
Cymothhoe howarthi Rydon, 1978

Subspecies

Celastrina placidula howarthi Cantlie & Norman, 1960
Jamides pura howarthi Hayashi, 1976
Simiskina phalena howarthi Steinhauser, 1974
Celaenorrhinus boadicea howarthi Berger, 1976
Ypthima watsoni howarthi Cantlie & Norman, 1959
Tanaecia lupina howarthi, Jumalon, 1975
Morpho sulkowskyi howarthi Le Moult & Real, 1962
Libythea geoffreyi howarthi Petersen, 1968

LOOKING BACK OVER EIGHTY-FOUR YEAR'S MEMBERSHIP OF THE SOCIETY: SOME MEMORIES OF PAST MEMBERS

T. Graham Howarth

For the last few years Alec Harmer and Tony Pickles have suggested to Graham that he might write down some of the reminiscences he entertained us with. This is the result, written in autumn 2014 when he was approaching his 99th birthday and unfinished at his death.

Whilst reminiscing over the last few years about past entomologists I have known, friends have suggested that I should put pen to paper and make some of my memories more widely available.

When I was a child our family home was in Woodlands Rise, Muswell Hill in north London. My brother Donald was five years older than me. My father was a commercial traveller and my mother took in paying guests. I used to look forward to holidays in the Breck, where I was encouraged in the pursuit of butterflies and moths by my maternal grandfather Harry Chapman, my uncle Charles, who was an all-round naturalist and Charlie Parrot who had a 2,000 acre holding near Wheaton. I remember the osier beds and the ragwort covered with insects.

A neighbour in Muswell Hill, Frank Young, knew the librarian at the South London and introduced me as being interested in moths. I was invited to come to a meeting at Hibernian Chambers and made very welcome though still a schoolboy. I became a regular at those meetings. I used to rush home from school, do my homework and then be out by six to get the bus to London Bridge. (Hibernian Chambers near London Bridge was the home of the 'South London' from 1889 to 1939).

Graham (second left) with Norman & Charley Parrott in the 1920s

I will deal with some of the entomologists I was privileged to know in alphabetical order and begin with Dr K. G. Blair. He was president of our Society on two occasions and professionally was a coleopterist working at the then British Museum (Natural History) in South Kensington. He was an active member who frequently led field meetings for the Society, and in addition to beetles was familiar with the Lepidoptera. He retired from the Entomological Department at the end of the 1939–45 war and moved to Freshwater on the Isle of Wight where he bought a Victorian villa overlooking the marsh. As I said, he was a good lepidopterist and used to leave his outside porch light on to attract the local moths. Because of this he became unique in having a hat-trick of species new to the British fauna named after him in their common names. In 1945 he had Blair's Wainscot *Sedina buettneri* (E. Hering, 1858), in 1946 Blair's Mocha *Cyclophora puppillaria* (Hübner, 1799) and in 1951 Blair's Shoulder Knot *Lithopane leautieri hesperica* Boursin, 1857.

In 1950 at the suggestion of Eric Classey, I went to Freshwater to collect a few specimens of *S. buettneri* with the aid of the latest technology, a mercury vapour lamp. I was lent a 125 w lamp on a tripod with a choke and a hundred yards of flex by Hugh Robinson, who was at that time busy designing his now famous trap. I found a plug-in at an hotel overlooking the marsh and all went well.

1950 was a good migrant year and at the weekend I was joined by quite a number of our members, all well-known lepidopterists. They were Eric Classey, Richard Ford of Watkins and Doncaster, Hugh and Peter Robinson, Archibald Wightman, Sir Robert Saundby and Barry Goater. All of these gentlemen have sadly passed away except for Barry, who is unique in having seen Blair's Wainscot in both its British sites: Freshwater and Maiden Newton, in Dorset.

Dr Blair was a very kindly person who had a physical condition which affected his upper eyelids and gave him a rather Mongolian appearance. I feel he might have done rather well in Eastern Russia, perhaps Vladivostok with his initials, KGB!

Having mentioned Eric Classey I should say that we started work at the Natural History Museum at the same time and became lifelong friends. We collected together in the thirties, joined the army together with consecutive service numbers, although I cannot remember which of us was first, and renewed our friendship after the war. In the early fifties when he launched the Entomologist's Gazette I was pleased to be able to support him with one or two articles which he published.

Dr Edward A. Cockayne, known as 'the Doctor' or to some as 'Cocky', was a great friend and we collected together on many weekends prior to 1939. It was a very great help for a novice such as me to have someone so knowledgeable regarding the early stages of the macrolepidoptera on hand to identify larvae and give hints on finding and breeding them. I vividly recall a trip when he and Bernard Kettlewell, who was also very kind to me, took me to Canvey Island and with their help I found larvae of nearly all the Lasiocampidae and Lymantriidae in very short order. This must have been in 1934 or 1935.

Cockayne was a consultant at Great Ormond Street Children's Hospital and lived in a service flat at 116 Westbourne Terrace, Paddington before moving to Tring during the 1939–45 War. I spent very many happy and productive hours with him at No. 116, selecting specimens from his many duplicates for my own small reference collection.

While up at Oxford obtaining his D. M., he became friends with Lord Haddo, the Marquis of Aberdeen. Lord Haddo met the Doctor's mother one vacation and eventually married her, so Cocky became Haddo's stepson while still at Oxford!

The Doctor smoked Churchman's No 1s heavily, not Woodbines as Salmon has it in *The Aurelian's Legacy*, and together with Leslie Goodson, his assistant at Tring,

who really was a chain smoker, they both eventually succumbed to lung disease. Of course Cockayne's and Kettlewell's collections were left to the Natural History Museum and together with Rothschild's formed the RCK collection.

Up until 1939 my great friend Eric Classey and I used to go to the entomological auctions at Stevens' in Covent Garden. These events gave many members a chance of a get together, as well as an opportunity to see how much some of our treasures would fetch under the hammer.

On one occasion the Doctor drew the auctioneer Stevens' attention to a lot catalogued as being 'almost unique' and pointed out that this was impossible as a thing was either unique or it wasn't, as uniqueness was a finite thing. It was like telling a young woman that she was a little bit pregnant!

The Doctor had a brother, L. C. Cockayne, who founded the Botanical Garden at Dunedin in New Zealand's South Island. Helen and I made a point of visiting this magnificent collection of New Zealand plants when we visited Dunedin to see where my mother-in-law had been born and brought up. My mother-in-law was a very talented artist and when the family moved from New Zealand to Muswell Hill in North London, was taught by Sir Lawrence Alma-Tadema R.A. at the Hornsey Art School. Sir Lawrence was the artist of the original oil painting used as the dust jacket illustration for Michael Salmon's '*The Aurelian Legacy*'. It's a small world!

At the time we visited the botanical gardens in the 1970s there was a large, table-sized rock in the main avenue with a brass plate in memory of L. C. Cockayne. I photographed this and was able to give a copy to 'Cocky' when Helen and I visited him in Tring shortly before his death.

Frederick W. Frohawk, the famous artist and author used to regularly attend our Society's Annual Exhibition at Hibernia Chambers at London Bridge before the 1939-45 war. He was usually attended by his daughter Valezina who as a young lady liked to bask in the glory of her illustrious father and also used rather a lot of makeup. She eventually married Viscount Bolingbroke and thus became the perfect example of an English Painted Lady! Not all that long ago she unveiled a plaque in a New Forest ride dedicated to the memory of her father. This ride was one of his favourites and where he liked to watch the Silver-washed Fritillaries.

Silver-washed Fritillary and Painted Lady gives me an opportunity to point out what I think is the absolute absurdity of the current practice of not using capitals for the first letter of the common names of our entomological subjects. I wonder what Messrs, Black, White, Brown and Green would think if we used the lower case when referring to them! In this instance it is a name, not just a noun and deserves a capital.

The next person I would like to mention is Captain Rex A. Jackson R. N. (Ret.) who was President of our Society in two consecutive years, 1945 and 1946; an unusual event. He was given this honour in grateful acknowledgement of his arranging for the Society to take over the tenancy of the rooms of the Royal Society at Burlington House, Piccadilly. If they had been in use at the time one might have said, 'What a post-code!' Capt. Jackson was a man of small stature with sandy hair, a deep bass voice and he sported a monocle. It was said that some of our members found the blind glare of his monocle in certain lights a little intimidating and that he was one of the few people who could strut whilst seated. Nevertheless he was a great benefactor of our Society as well as a knowledgeable entomologist.

Next I come to Louis Beethoven Prout, the geometrid specialist. He was the world authority on this family of moths from the Palaearctic region and wrote the section in A. Seitz's *Macrolepidoptera of the World* covering this family and region. This was a major opus of over four hundred pages. Prout was a little grey man with thinnish grey hair, a straggly grey beard and a grey suit; he had a high pitched nasal voice.

Another strange characteristic was that he never seemed to walk anywhere but trotted! He led a peripatetic existence going far and wide in search of collections of Geometridae which he could curate.

Helen and I used to visit the Chiltern Hills and on one occasion we were on the scarp overlooking the Vale of Aylesbury near Tring when we came across a strategically placed seat. The seat had a brass plate stating 'to the memory of L. B. Prout, lepidopterist, his favourite view point.'

Though not a member of our Society, Sir Terence Morrison-Scott was a mammologist and the Director of the Natural History Museum at South Kensington in the 1960s. He was a tall, very handsome man. On one occasion I was on my way out of the museum at lunchtime closely followed by Sir Terence. At the twin double doors I held the inner door open for him. He walked through and just as he opened the other door a dozen or so uniformed pre-teen school girls began to file through. He continued to hold one door and I the other and he remarked to me, 'You know, Howarth, it's this thirst for knowledge!' As the school mistress followed through she thanked us both with a smile which seemed to make it all worthwhile.

In the 1950s one of my correspondents, a Mr G. C. Stubbs of Kuala Lumpa wrote saying that he had captured a small lycaenid, at Frazers Hill, Pahony, that he did not recognise. He thought that it might belong to the genus *Niphanda,* although its upperside ground colour was a light orange instead of the normal blue. I was unable to help him and suggested he bring the specimen into me the next time he was in London. He did this later and the butterfly appeared to be undescribed. I said that I would like to describe it if he would donate it to the museum, and that I would name it after him as being the captor and donator. A little bribery often works!

The description duly appeared in the *Entomologist* for 1956. The little butterfly *Niphanda stubbsi* Howarth is something very special to me for not only has it remained unique (not almost unique) for some fifty-eight years, but it was the first new butterfly species I described.

I would like to take this opportunity to express my most sincere thanks to Tony Pickles and Alec Harmer for their generous help with this valedictory article of mine and for their valued friendship and help over the years.

GRAHAM HOWARTH
(Autumn 2014) Ferndown, Dorset.

REFERENCES

Chalmers-Hunt, J. M. 1976. *Natural History Auctions 1700–1972*. P. 3 *et seq*. Sotheby Parke Bernet, London.

Howarth, T. G. 1956. *The Entomologist* **89**: 161–162

James, M. J. *The New Aurelians*. (Our Society's occupation of Hibernian Chambers.)

Salmon, M. A. 2000. *The Aurelian Legacy*. Dust Jacket and brief biographies of Cockayne, Kettlewell and others mentioned. Harley Books, Colchester.

THE FIRST OCCURRENCE OF *BILOBELLA BRAUNERAE* DEHARVENG (COLLEMBOLA: PODURIDAE) IN THE UK

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Abstract

The first UK occurrence of the bright pink poduromorph springtail *Bilobella braunerae* Deharveng is reported from a garden in Shropshire. Although only described in 1981, this distinctive species has been expanding its range in Europe, originally described from Austria but now found in Germany, the Netherlands, Luxembourg, France, Hungary and Italy as well as the UK. It is not obvious how it came to be in Shropshire but should be looked out for in the UK under decaying bark, usually in the company of another (common) springtail *Neanura muscorum* (Templeton).

Introduction

Along with many other life forms, the UK is undergoing colonisation by non-native species of Collembola, although the remarkable observation that several appear to be new to science (Ardron, 2009) makes the recording problematic. Here we report the first record of another non-native springtail, *Bilobella braunerae* Deharveng 1981, which is relatively large, bright pink and moving north through mainland Europe and so may be expected to be discovered again.

Methods

Specimens were first collected from under loose, decaying bark on cut, broadleaved logs at Church Farm, Shropshire, OS grid reference SO704854 on 12 January 2015, with subsequent collections on 28 January and 27 March 2015 where specimens were found in rotted wood that had almost decomposed to soil (Plate 12, Fig. 1). This habitat contained a mixture of poduromorph Collembola, mostly blue-grey animals that proved to be the common species *Neanura muscorum* (Templeton), but mixed in with them were other Collembola of a similar morphology but bright pink in colour. These were initially assumed to be unusual *Monobella grassei* (Denis,), a yellow/orange podurid that is commonly associated with *Neanura* species, but when keyed using Hopkin (2007) its combination of 2 + 2 ocelli, pink colour and short body setae ruled out all of the four large hairy and furca-less podurids known to occur in the UK (Hopkin 2007, p. 36).

Results and discussion

The keys in Stach (1951) took the pink podurids to be in the genus *Bilobella*, but only listed *B. aurantiaca* (Caroli), a common orange-yellow species of southern Europe. Further reference to Deharveng (1981) and Berg (2009) identified these as *Bilobella braunerae* Deharveng 1981, the first UK record for this distinctive species (Plate 12, Fig.1). Berg (2009) reported that it is usually found in the company of the

common grey collembolan *N. muscorum*, exactly as was the case in Shropshire. Although the field colouration is clearly different to that of *B. aurantiaca* this is of limited taxonomic value in the laboratory as the colour fades in alcohol, with complete colour loss taking just a few minutes in the 100% ethanol required for DNA preservation (Plate 12, Fig. 2). The chaetotaxy is reported to differ, with *B. braunerae* having six macrosetae on its antenna-frontal tubercle (A,B,C,D,E and O following Deharveng (1981)) while *B. aurantiaca* has only five (lacking macroseta 'O'). Unfortunately, Deharveng observed (personal communication February 2015) that this character is not reliable, with some definite specimens of *B. braunerae* lacking seta 'O', and that currently colour when alive remained the best diagnostic feature. Confirming this view, the author has examined slide-mounted specimens of *B. aurantiaca* in collections held in the Natural History Museum, London, as well as fresh collections of *B. braunerae* sent by Matty Berg from the Netherlands, and found that the chaetotaxy of the cephalic tubercles seems to be variable / prone to chaetal loss, especially in smaller specimens. Accordingly, photographs of live or recently dead specimens will be vital for confirming the identity of any future UK collections.

It is not thought that the decaying timber involved was imported, leaving the importation path of this new springtail unknown. Although highly visible and only recently described (from a collection from Kreuzenstein, Austria, 1980), this distinctive species is now known from Italy, Austria, Hungary, the Netherlands and Luxembourg (Stomp & Weiner, 2005; Berg , 2009). A fourth site for this species in the Netherlands was found in Limburg in January 2015 (M. Berg pers. comm.). In addition to the published records, this species can be identified reliably from photographs. The collection of Collembola photographs held by Frans Janssens at *www.collembola.org* includes multiple photographs of *B. braunerae* from France and Germany. All these observations are concordant with this being an initially scarce species now undergoing range expansion. It would therefore be worthwhile checking under loose, decaying bark of recumbent logs and timber elsewhere in the UK for the highly visible Collembola, especially if *N. muscorum* is abundant there.

Springtails (Collembola) are among the better recorded soil groups, with a unified UK database that contains records going back to 1848 (held by the author, and accessible via the NBN Gateway *https://data.nbn.org.uk/*), allowing broad trends in common species to be ascertained, such as the increase of *Dicyrtomina saundersii* (Lubbock) at the expense of the once-common *Dicyrtomina ornata* (Nicolet) (Shaw, Faria & Emerson, 2013). The main trend in UK Collembola records during the last decade has been a steady increase in discoveries of non-native species, usually by photomicrographs uploaded to photo-sharing web pages (e.g. *www.Flickr.com*). Ardron (2009) supplied photographs of 12 non-native Collembola found in Sheffield and Cornwall, of which at least three have been confirmed as being new to science but remain undescribed (P. Greenslade pers. comm.). This process is neither new, nor confined to the UK: Porco *et al.* (2013) used molecular barcoding to explore the population structure of Collembola (notably *N. muscorum*, *Orchesella villosa* (Geoffroy) and several clades of *Parisotoma notabilis* (Schäffer), plus earthworms) in Europe and the USA, and found evidence that European Collembola had been repeatedly (if accidentally) introduced to the USA, followed by rapid range expansion. On remote islands there are several instances where a native Collembola fauna appears to have been replaced by introduced European species, including St Helena where no native Collembola could be found at all (Mendel, Ashmole & Ashmole, 2008). Less extreme but still clear examples of invasive Collembola come from Tenerife, Puerto-Rico and Marion Island (Shaw, Faria & Emerson, 2013).

It remains to be seen whether *Bilobella braunerae* becomes a permanent member of the UK's detrivore/soil fauna, but on balance this does seem likely.

Acknowledgements

The authors wish to express their thanks to Matty Berg (Vrije Universiteit or VU University, Amsterdam) for sending fresh samples of *B. braunerae* from The Netherlands and news of recent collections of *B. braunerae;* to Louis Deharveng for several helpful email exchanges about taxonomic features in the genus *Bilobella*; to Penny Greenslade for inspecting some unknown Katiannidae collected in the UK; and to Paul Brown (NHM) for access to the slide collection.

References

Ardron P. 2009. Aliens in Inner space: The occurrence of diverse communities of exotic springtails in formal gardens and more widely in the British landscape. *International Urban Ecology Review* **4**: 1–23.

Berg, M. 2009. De Springstaarten van Nederland: het genus *Bilobella*, nieuw voor de fauna, en *Neanura* (Hexapoda: Entognatha: Collembola). [Springtails of the Netherlands: genus *Bilobella*, new to the fauna, and *Neanura* (Hexapoda: Entognatha: Collembola)]. *Nederlandse Faunistische Mededelingen* **31**: 101–112.

Deharveng, L. 1981. Nouvelles espèces de neanurinae européens appartenant aux genres *Bilobella* et *Monobella. Bulletin de la Société d'Histoire Naturelle et des Sciences Biologiques et Ënergétiques de Toulouse* **1**: 95–102.

Hopkin, S. 2007. *A Key to the Collembola (springtails) of Britain and Ireland.* FSC: AIDGAP series.

Mendel, H., Ashmole P. & Ashmole, M. 2008. *Invertebrates of the central peaks and peak dale, St Helena – Final Report*. Saint Helena National Trust.

Porco, D., Decaëns, T., Deharveng, L., James, S.W., Skarzyñski D., Erséus, C., Butt K. R., Richard B. & Herbert P. D. N. 2013. Biological invasions in soil: DNA barcoding as a monitoring tool in a multiple taxa survey targeting European earthworms and springtails in North America. *Biological Invasions* **15**: 899–910.

Shaw, P. J. A., Faria C. & B. Emerson, B. 2013. Updating taxonomic biogeography in the light of new methods – examples from Collembola. *Soil Organisms* **85**: 161–170.

Stach, J. 1951. *The Apterygotan fauna of Poland Volume 2. Family Bilobidae*. p.1–97. Polish Academy of Sciences, Kraków.

Stomp, N. & Weiner W. M. 2005. Some remarkable species of Collembola (Insecta: Apterygota) of the Luxembourg sandstone area. *Ferrantia* **44**: 227–232.

SHORT COMMUNICATION

***Meloe proscarabaeus* L. (Coleoptera: Meloidae) in Somerset**. – A large, gravid female (40mm in length) was found walking along a path through a lime grove in the grounds of Glastonbury Abbey on 23.v.2015 (see Plate 10, Fig. 3). Abbey grounds-staff say they had seen another similar specimen the year before, nearby in the rough grassland adjacent to a "wildlife area" they had created. Ramsay (2002) states that although this species of Oil Beetle is meant to be our most common there are few recent records: the coastal southwest is mentioned as being a stronghold. There are some other 2015 records for Somerset on the NBN Gateway but all the oil beetles seem to be rapidly declining. – Clive Betts, 23, Devonshire Place, Exeter, Devon EX4 6JA.

Reference

Ramsay, A. 2002. Identification: British oil beetles. *British Wildlife* **27**: 27–30.

BOOK REVIEW

Planet of the Bugs: Evolution and the Rise of Insects by Scott Richard Shaw. University of Chicago Press, 2014. Hardback. 256pp. £19.50. ISBN 978-0-2261636-1-1.

What is, and has been the most numerous and most diverse group of multicellular animals on earth? We all know the answer of course, but many don't. It's not mammals or reptiles or birds: it's insects. They get a bad press: watch Springwatch or Autumnwatch, the BBC's prime-time TV programmes about wildlife and you would think birds were more numerous than any other creatures, possibly apart from otters and badgers which usually appear within 10 minutes of the programmes starting. Even if insects do get a mention, it is just that, a name, the absolute briefest of life history detail and then back to birds. Even the BBC's mammoth(!) series on insects, had to be renamed 'Life in the Undergrowth' because female producers were apparently afraid the 'insect' word would reduce the series' popular appeal (so word on the street has it).

But now it seems a saviour has come along at last in the form of Scott Shaw, a Professor of Entomology and Insect Museum Curator at the University of Wyoming, USA. He has set about putting the record straight by presenting life on earth – both past and present from an insect-centric point of view – no dinosaurs here. He unfortunately uses the word 'bug' throughout to mean any type of insect, not just those belonging to the hemipteroid complex with sucking mouthparts, but after a time this doesn't seem to grate too much (well, just a little). The main sections trace the origin and diversification of arthropods – the taxonomic grouping that embraces insects, spiders, centipedes, crabs and shrimps and others with more than six legs. Chapter by chapter he moves through different geological time periods describing the physical conditions and changes happening on earth and introducing new orders of insects as they appear in the fossil record. The Silurian period, usually referred to as the 'Age of Fishes' is recast as the time when the ancestors of insects first emerged onto dry land. Giant Protodonata, griffen flies, appeared in the early Permian 280MY – these pterosaurs of the insect world had wingspans of up to 710 mm in the case of *Meganeuropsis permiana*, the largest flying insects to occur on earth, a magnificent achievement of evolution adapting to high-oxygen environments. The infamous Jurassic period is renamed as the Age of Wasps, a far more diverse, speciose and longer-lasting group of animals than the dinosaurs, featherly sorts not withstanding.

A rather important idea that he offers is his hypothesis that the earth's supply of fossil fuels, upon which we rely for nearly everything today, might be due to the 'absence' of insects. Oil and gas deposits are confined to strata laid down during the Carboniferous period when large land plants first appeared and flourished before phytophagous insects such as termites capable of digesting cellulose had a real chance to evolve and eat them. Plants died and became fossilised in mega quantity in the absence of such insects. Thus insects were important because they weren't up to their usual tricks of defoliation and breakdown in sufficient numbers – a combination of events unlikely to be repeated in the foreseeable future though warmer global temperatures are predicted. It is interesting to reflect that there was a time not so long ago when oil companies actually employed entomologists.

All in all the author presents a very interesting and entertaining account of the dominant life form on this planet with many thought-provoking ideas. So step outside your comfort zone and buy it.

JOHN BADMIN

RHOPALOPYX ELONGATA (HEMIPTERA, AUCHENORRHYNCHA: CICADELLIDAE) NEW TO BRITAIN

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ABSTRACT

The leafhopper *Rhopalopyx elongata* W. Wagner is reported from three widely separated sites in southern England: Lullington Heath and Ovingdean in East Sussex and Wanstead Flats in South Essex. These records are the first ones for this species in Britain. Its appearance in three localities over three years suggests this species is now established in Britain.

INTRODUCTION

A single male of an unfamiliar leafhopper was taken by AJAS on 12 September 2013 at Lullington Heath National Nature Reserve (TQ548018) in East Sussex (VC14). After dissection and examination of the genitalia, the specimen was initially keyed out using Le Quesne (1969) to *Rhopalopyx* (= *Paluda*) *vitripennis* (Flor), a species known from Ireland although not recorded from the British mainland. Reference to the continental literature, however, using Biedermann and Niedringhaus (2009) and Dmitriev (1999) revealed that it was in fact *Rhopalopyx elongata* W. Wagner 1952, a species new to Britain.

Lullington Heath contains the largest remnant area of chalk heath vegetation in Britain, a diverse community comprising an intricate combination of calcicole and calcifuge plant species (Ratcliffe, 1977). The Auchenorrhyncha fauna reflect this unusual plant assemblage, containing a mixture of species normally associated with calcareous and acid grasslands, the former predominating at this site (Fisher Barham & Stewart, 2005). The specimen of *R. elongata* was collected in the course of routine suction sampling of long-term experimental grazing plots set up on an area of open chalk heath. It was taken from a 4 × 4 m plot that had previously been fenced to exclude domestic stock (sheep, ponies) but allow rabbit grazing. The fencing had been removed five years previously since when the whole area had reverted to low vegetation containing significant cover of Bell Heather, *Erica cinerea*, and Ling, *Calluna vulgaris*, mixed with a diversity of chalk grassland species. Although collected from one particular plot, the specimen was unlikely to have been attracted to the experimental treatment as such. The Auchenorrhyncha fauna of these plots have been monitored annually since 2002, involving several thousand specimens, but this was the first occasion on which any *Rhopalopyx* or *Paluda* species were recorded. Three return visits to the site in 2014 for continued sampling of the plots and collecting in the same general area failed to produce any further specimens.

Two male specimens of *R. elongata* were collected by TB on 2nd September 2014 at Wanstead Flats (TQ4086) in South Essex (VC18). Both were swept from dry acid grassland dominated by Common Bent *Agrostis capillaris* and Red Fescue *Festuca rubra*, although numerous other grass species were also present together with extensive cover of Sheep's Sorrel *Rumex acetosella* and large stands of Broom *Cytisus scoparius*. Auchenorrhyncha have been regularly recorded at this site since 2009, but no *Rhopalopyx* or *Paluda* species previously detected.

A single male specimen of *R. elongata* was collected by NG on 25th June 2015 on a strip of cliff-top grassland (dominated by *Festuca* sp.) at Ovingdean (TQ358026) in East Sussex (VC14). Females of this species cannot be determined with certainty, but a female collected concurrently was found to accord with the description in Biedermann & Niedringhaus (2009).

Description

Adults are 3.0–4.0mm in length. The entire dorsal surface is light yellowish green with no dark colouration and the general habitus is similar to *Paluda flaveola* (Bohemann), except that the vertex is more obviously pointed and the overall size is smaller. The face has a small dark spot at the base of each antenna but is otherwise unmarked. The critical character concerns the appendages of the lateral lobes of the pygofer, which are directed obliquely backwards in *R. elongata* and *R. vitripennis*, rather than being curled round to point forwards in *P. flaveola*. *Rhopalopyx vitripennis* has a cluster of spines (macrosetae) on the apical part of each of these appendages, but in *R. elongata* these are absent and the tip is distinctly stepped (Fig. 1). Species-specific differences in the form of the aedeagus are much more subtle and rather comparative. In view of the very close similarity between many members of this genus, Irish specimens in the British Collection of the Natural History Museum were re-examined and confirmed as *R. vitripennis*. It should be pointed out that the key and associated figure in Ribaut (1952) referring to *R. vitripennis* is in fact *R. elongata*, prior to its recognition by Wagner as a separate species, whereas his depiction of *R. monticola* Ribaut 1939 is in fact *R. vitripennis* (Flor, 1861).

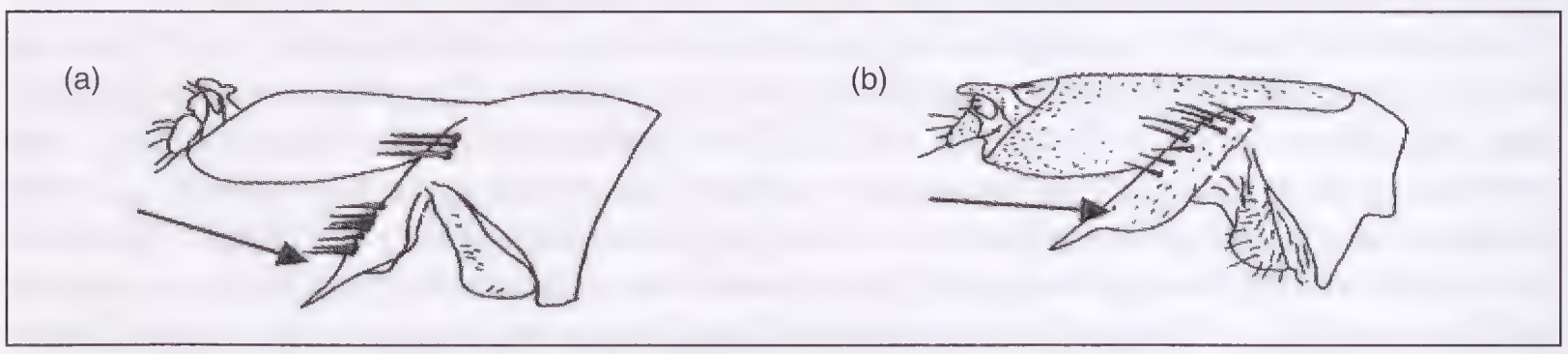


Fig. 1. Appendages of the lateral lobes of the pygofer: (a) *Rhopalopyx vitripennis* (b) *Rhopalopyx elongata*. After Biedermann & Niedringhaus (2009).

Ecology and distribution

Rather little is known about the ecology of this species other than that, like others in the same genus, it probably feeds on grasses. Nickel (2003) surmises that it is probably bivoltine and overwinters in the egg stage in common with its congeners. In Germany, adults have been recorded between June and October "in rather dry and sun-exposed sites on limestone and sand" (Nickel, 2003). The species has been reported from southern Europe including the Alpes-Maritimes and Corsica (della Giustina, 1989), Spain and Italy, but also Switzerland (Dmitriev, 1999) and The Netherlands (Nast, 1972). Ribaut (1952) lists a number of localities for *R. vitripennis* in France as well as the Caucasus and Siberia, but given the nomenclatural changes referred to above these may be unreliable for characterising the distribution of *R. elongata*. *Rhopalopyx vitripennis* was erroneously added to the list in Wilson *et al.* (2015), but should now be replaced by *R. elongata*.

Acknowledgements

The authors would like to thank Malcolm Emery (Natural England) for permission to collect at Lullington Heath and Mick Webb (Natural History Museum) for dissection of Irish *Rhopalopyx* specimens.

References

Biedermann, R. & Niedringhaus, R. 2009. *The Plant- and Leafhoppers of Germany*. WABV-Fründ: Scheeßel.

della Giustina, W. 1989. Homoptères Cicadellidae. Vol. 3. Compléments aux ouvrages d'Henri Ribaut. *Faune de France* **73**: 1–350.

Dmitriev, D. A. 1999. A Review of Species of the genus *Rhopalopyx* Ribaut, 1939 (Homoptera, Cicadellidae). *Entomological Review* **79**: 563–575.

Fisher Barham, D. & Stewart, A.J.A. 2005. Differential indirect effects of excluding livestock and rabbits from chalk heath on the associated leafhopper (Hemiptera: Auchenorrhyncha) fauna. *Insect Conservation and Diversity* **9**: 351–361.

Le Quesne, W.J. 1969. Hemiptera (Cicadomorpha – Deltocephalinae). *Handbooks for the Identification of British Insects* II, Part 2(b).

Nast, J. 1972. *Palaearctic Auchenorrhyncha* (*Homoptera*). *An annotated check list*. Polish Scientific Publications: Warszawa.

Nickel, H. 2003. *The leafhoppers and planthoppers of Germany* (*Hemiptera, Auchenorrhyncha*): *patterns and strategies in a highly diverse group of phytophagous insects*. Pensoft: Sofia-Moscow.

Ratcliffe, D. A. 1977. *A Nature Conservation Review. The selection of biological sites of national importance to nature conservation in Britain. Volume 1*. 401 pp. Cambridge University Press.

Ribaut, H. 1952. Homoptères Auchenorhynques. II (Jassidae). *Faune de France* **57**: 1–474.

Wilson, M., Stewart, A., Biedermann, R., Nickel, H. & Niedringhaus, R. 2015. *The Planthoppers and Leafhoppers of Britain and Ireland*. WABV-Fründ: Scheeßel.

FIELD MEETINGS

Roundhill Mire and Woolmer Forest, Bordon, Hampshire, 10 August 2013

Leader: **Stephen Miles**. – Permission was obtained from the Ministry of Defence for this joint BENHS/Alton Natural History Society daytime field meeting at a location threatened by the southern part of the proposed route of the new, so-called, Whitehill and Bordon Inner Relief Road. The BENHS members present were Tony Dobson, Roger Booth, Tony Allen and the leader, Stephen Miles. The ANHS members were Tina and Dave Hamilton, Jenny Hallett, Andy Love and Penny and Ted Raynor, who stayed for the morning session only.

The habitats present on this site are heathland, scattered deciduous and coniferous trees, with areas of scrub, acidic seasonal ponds and mire areas. We were most fortunate to experience dry sunny weather in the morning but with increasing cloud cover in the afternoon, though it still remained dry.

The purpose of the meeting was for general recording in an area not often studied, and lying outside the main heathland areas of Woolmer Forest to the south and east that comprise the Site of Special Scientific Interest (SSSI), European designated Special Area of Conservation (SAC) and Special Protection Area (SPA) areas. Roundhill Mire is only a Site of Interest to Nature Conservation (SINC) and thus carries no statutory protection despite supporting a number of nationally significant species.

The butterflies recorded in the vicinity of the heathland and woodland surrounding Roundhill Mire were: Large White (1), Small and Green-veined Whites (2, 2), two Small Coppers in copula, Common Blue (6), plus Meadow Brown (5),

Small Tortoiseshell (1), Comma (1), Grayling (2) and also two migrant Clouded Yellows with the commonest species being the Gatekeeper at 20+ specimens. There were also Common Darter, Brown Hawker and Emperor Dragonflies in the vicinity. Mottled, Field and Meadow Grasshoppers were seen and with the suspicion of one Large Marsh Grasshopper also observed, the latter of which has previously been recorded in this area according to the national Orthoptera atlas. Sand Spurrey *Spergularia rubra,* typical of heathland habitat was recorded in relative abundance by Penny Raynor. Tony Dobson was quite assiduous in searching the wet mire and heathland areas and among the commoner micro and macro moths, he recorded three larvae of the Ling Pug, *Eupithecia absinthiata f. gooseniata* Mabile, he also recorded the following leaf miners, *Stigmella betulicola* (Stainton) from a few vacated mines on small birches, others on this foodplant were *Phyllonorycter anderidae* (Fletcher) and *P. ulmifoliella* (Hübn.), with *P. dubitella* (H.-S.) and *P. salicicolella* (Sircom) found on *Salix* spp., and finally two adults of the pyralid *Agriphila inquinatella* (D. & S.) were disturbed from gorse bushes. Amongst the macro moths recorded were the Fox moth *Macrothylacia rubi* (L.) from a cluster of empty eggshells found on a dead rush stem by Tony and the Beautiful Yellow Underwing moth *Anarta myrtilli* (L.) found by Penny Raynor. A Slow-worm was also found east of the mire areas under bracken.

The more significant bird species out of the 19 heard or observed, mainly by Ted and Penny Raynor were: Treecreeper (2), Blackcap, Chiffchaff, Song-Thrush, Goldcrest, Whitethroat – (the latter actually within the SPA area), Bullfinch and Siskin.

Roger Booth and Tony Allen attended particularly because of the interesting beetle fauna reported from the site by a series of coleopterists, including Jonty Denton and Fred Goodliffe. They worked the most westerly part of Roundhill Mire at SU793338 in the morning and the dried-up shallow seasonal ponds in the afternoon along the western fringes of the site outside the SPA and Range Danger Area west of Range 2 at SU789330. A comprehensive list of fifty beetle species was recorded, including the water beetle, *Rhantus suturellus* (Harris). This species was recorded both by Mr Goodliffe and S. E. Allan in the 1950s, (the latter record from Woolmer Pond) under its previous name of *Rhantus bistriatus*. Roger Booth commented that *R. suturellus* is a common and widespread species in the north of the UK but is very local and restricted to wet heathland in the south of England. When Mr Goodliffe had taken it, he described it as associated with peat-forming habitats. Roger also recorded the Notable B staphylinid beetle, *Stenus fornicatus* Stephens. Another aquatic beetle of interest was the dryopid *Dryops striatellus* (Fairemaire & Briscout), a species restricted to southern heathlands. Careful searching further south at SU789330 in the dried bed of a pond beside the range perimeter track revealed the presence of a Notable B carabid species, *Stenolophus teutonus* (Schrank) and two southern weevil species, *Nanophyes gracilis* (Redtenbacher) and *Pelenomus olssoni* (Israelson) that are both RDB3 status and which feed on Water Purslane, *Lythrum portula*.

In the grasslands of the western portion of the area, the leader, Stephen Miles recorded single examples of the Brown Argus, Small Copper and Grayling and separately Tony Dobson recorded six specimens of the Grayling butterfly: all the species are known to occur in the vicinity quite frequently.

Acknowledgement

For permission to hold this meeting, thanks go to the Chairman of the Longmoor Conservation Group, representing the Defence Infrastructure Organisation.

Print Wood, nr Leamington Spa, Warwickshire, 10 July 2014

Leader: **David Brown**. – This meeting was held at a location where no previous recording had taken place. Print Wood is a small deciduous woodland consisting mainly of oak. The night of 10th July was partially cloudy, calm with a minimum air temperature of 15°C. The leader was the only BENHS member in attendance with 10 local enthusiasts operating six MV lights and one 20W actinic.

In all 59 species of macromoth were recorded until the time of departure at 2.40h in the early morning. The most noteworthy species from a local perspective were Large Twin-spot Carpet *Xanthorhoe quadrifasiata* (Clerk), Small Yellow Wave *Hydrelia flammeolaria* (Hufn.), Dingy Footman *Eilema griseola* (Hübn.), Buff Footman, *E. depressa* (Esper), White Satin *Leucoma salicis* (L.), Coronet *Craniophora ligustri* (D. & S.), Lunar-spotted Pinion *Cosmia pyralina* (D. & S.) and Slender Brindle *Apamea scolopacina* (Esper).

The leader would like to thank all who joined him and special thanks to the owner of the wood, Mike Blyth.

Dinton Pastures Country Park, Reading, Berkshire, 11 October 2014

Leader: **Ian Sims.** – This was a joint meeting between the British Entomological and Natural History Society (BENHS), Berkshire Moth Group (BMG), Reading and District Natural History Society (RDNHS) and the Berkshire Invertebrate Group (BIG). The aims of the meeting were two-fold, firstly, to record leaf-mining micro-Lepidoptera, and secondly, to introduce participants who were unfamiliar with this group to the various characteristics of leaf-mines used to identify the various genera of leaf-mining moths.

By 10.30h a large party, representing all of the groups mentioned above, had assembled in the car park outside the Pelham-Clinton building, in which a Myriapod Identification workshop was being run at the time.

Our meeting commenced with an introduction to leaf-mining micro-Lepidoptera and the various forms that their mines can take, during which some illustrations (Fig. 1) were handed out so that they could be used in the field as a ready reference. Methods for rearing the different genera were also discussed, after which we set off towards the "Fisherman's Car Park", taking a road bordering the park. Progress was slow on account of the close scrutiny given to the various species of foliage we passed.

Some of the first mines found were on Norway maple (*Acer platanoides*). These included the large pale blister (or tentiform) mine of *Phyllonorycter joannisi* (Le Marchand), typical of this genus of gracillariid moths, on the undersides of the leaves, and the serpentine mine of *Stigmella aceris* (Frey) typical of the gallery-forming nepticulids. Until relatively recently, *S. aceris* was only doubtfully recorded for the British Isles, but in the last 10 or 15 years it has undergone an astonishing spread of range across virtually the whole of southern England, and perhaps further.

Another micro-lepidopteran on Norway and field maples (*A. campestre*), though not strictly a leaf miner in its later stages, was another gracillariid *Caloptilia semifascia* (Haworth). Larvae of this genus usually feed on the underside of leaves from within a cone rolled up on the edge of the leaf. This distorted leaf area is secured with silk, which shrinks as it dries holding the cones in position.

Another interesting species was *Phyllonorycter tenerella* (Joannis), mining hornbeam (*Carpinus betulus*) leaves. Larvae of this species make blister mines on the underside of the leaf, and are restricted to an area of leaf bounded by two adjacent veins (usually near the petiole). Hence, their mines are long, narrow and highly arched. The other hornbeam feeder in this genus, *P. esperella* (Goeze), which

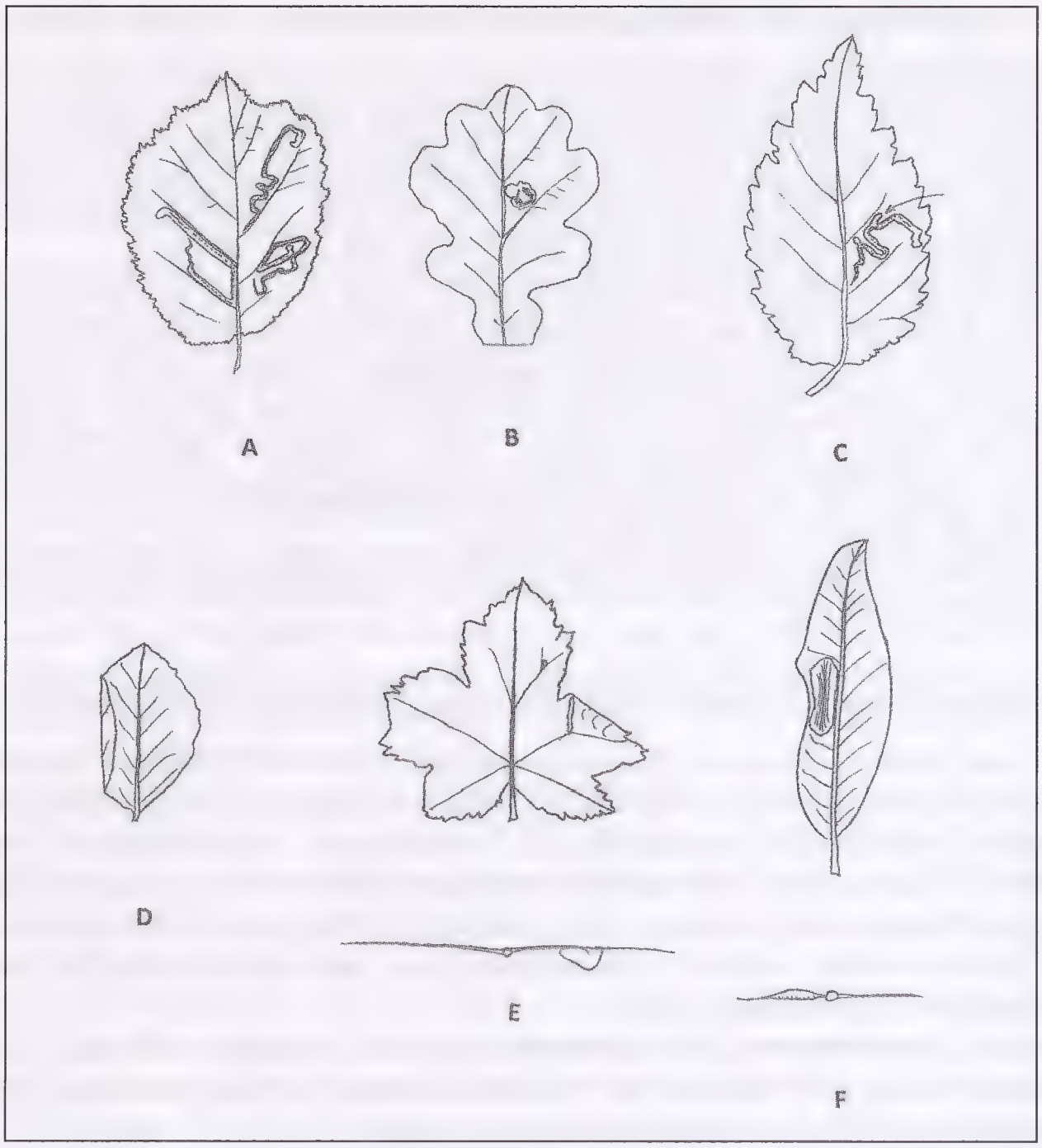


Fig. 1. Mines of our commoner families of leafmining Lepidoptera.
A = Serpentine mine of the nepticulid *Stigmella microtheriella* (Stain.) in hazel
B = Blotch mine of the nepticulid *Ectoedemia albifasciella* (Hein.) in oak
C = Serpentine mine of the bucculatricid *Bucculatrix albedinella* (Zell.) in elm (arrow indicates characteristic side branch of gallery
D = Fold caused by the gracillariid *Parornix fagivora* (Frey) on beech
E = Cone of the gracillariid *Caloptilia semifascia* (Haw.) on sycamore
F = Blister or "tentiform" mine of the gracillariid *Phyllonorycter messaniela* (Zell.) on underside of ilex oak.

makes its mine on the upper side of the leaf and crosses several veins, was also seen in greater numbers than the scarcer *P. tenerella*.

Towards the end of the meeting we found one of the best species of the day, *Phyllonorycter comparella* (Duponchel). This makes underside blister mines in grey poplar (*Populus* × *canescens*) which, unusually for this genus, are hardly inflated. Another unusual feature of this species is its overwintering strategy. Whereas most *Phyllonorycter* species over-winter as pupae in their mines, this species hatches as an adult in the autumn and over-winters as an adult in thatch etc. It has a limited range in Britain, and is known from only a handful of sites in Berkshire.

By lunch time most of the group were "all mined out", so it was decided to end the meeting. As leader I think I achieved one of my aims – to raise awareness of leaf-mining micro-Lepidoptera and encourage observers to try identifying them, at least to genus level. Once you can do this you are well on the way to being able to name most to species level, as within genera the majority of species are host-plant specific!

Those that are not you can always try rearing to identify the resultant adults, but that is for another day.

In total we recorded 45 species of leaf-mining micro-Lepidoptera, one adult choreutid *Anthophila fabriciana* (L.) and one old larval case of the bagworm *Psyche casta* (Pallas). Had a greater range of plant species been examined no doubt this would have resulted in a more extensive species list.

Bladon Heath Wood, Bladon, Oxfordshire, 20 June 2015 – with a historical review of the moth recording at this site

Leader and author: **Paul Waring** – Bladon Heath Wood is a private wood, owned by the Duke of Marlborough and administered from Blenheim Palace. The leader has had an interest in the wildlife of this wood since 1975, and has led two previous BENHS field meetings on this site, the results of which do not appear to have been published in this journal at the time. The opportunity is taken here to report both the results of the meeting which took place on 20 June 2015 and to review previous moth recording within the wood, as well as to record briefly how the wood has changed in the last 40 years.

Bladon Heath Wood is on the other side of the Bladon to Cassington road from the smaller Burleigh Wood and probably the two were regarded as a single wood in the past. Burleigh Wood has a long written history which has been traced back to 1226 by Violet Steed (1964). It is likely that parts of both these adjacent woodlands are ancient. The flora suggests this, containing plants considered ancient woodland indicators such as Yellow Archangel *Lamiastrum galeobdolon* L. and Field Maple *Acer campestre* L.

There used to be an area of heathland adjacent to the wood, complete with an abundance of Ling Heather *Calluna vulgaris* L. A colour photograph of this heathland, taken in August 1944 by F. Ballard, when the Heather was all in flower, can be found as Plate 17 in Turrill (1959). Turrill (1890–1961) was a well-known botanist of his day who was born and raised in the small market town of Woodstock, only two miles from Bladon Heath Wood, and who later worked at the Royal Botanical Gardens, Kew. The heathland is long-gone, lost to agriculture or forestry, and now only the name of the wood recalls its former existence.

When I attempted to research the moth records for Bladon Heath Wood in October 1984, the only records at the Oxfordshire Biological Records Centre on my visit on 10 October were on a single annotated card of the type produced for moth recording by the Biological Recording Centre (BRC) at Monks Wood. The card is labelled Col. A. M. Emmet 1940–1960, with the box for habitat filled in as "Heather/ Mixed Woodland". The card lists only a few Lepidoptera and the particular species suggest it is the result of possibly a single daytime visit only. The 13 species include a Mouse moth *Amphipyra tragopoginis* (Clerck), which dates the visit to July–August, the flight season of the adult, as a larval record of this species is most unlikely. The other species listed include the Lesser Treble Bar *Aplocera efformata* (Guen.), Yellow Shell *Camptogramma bilineata* (L.), Vapourer *Orgyia antiqua* (L.), Chevron *Eulithis testata* (L.), Grey Pine Carpet *Thera obeliscata* (Hübn.), Spruce Carpet *T. britannica* (Turn.), Flame Carpet *Xanthorrhoe designata* (Hufn.) and Scarce Footman *Eilema complana* (L.), all of which are found easily by day at this time of year and have been found also in recent years. The most noteworthy of Emmet's records are two species which are dependent on heathers (*Calluna and Erica* spp.) – the True Lover's Knot *Lycophotia porphyria* (D. & S.) (but listed on the BRC card under the formerly used name *Lycophotia varia*) and the Narrow-winged Pug *Eupithecia nanata* (Hübn.). The

remaining species is the Scalloped Oak *Crocallis elinguaria* (L.) which is well-distributed and fairly numerous in central and southern England, but not as frequently encountered by day as the other species above.

I have found no evidence of moth recording in Bladon Heath Wood prior to the 1920s, though there are records from the village of Bladon prior to 1905 (see later). Walker (1926) reviewed the knowledge about the macro-moths of the Oxford District up to the 1920s, including the work of A. Sidgwick and others reaching back into the 19th century. He does not mention Bladon Heath Wood once, though he refers to the moths of Wytham Wood, Boar's Hill, Bagley Wood, Tubney, Henwood, Stow Wood, Headington Wick, Prattle Wood, Stanton Little Wood, Shotover, Cothill and various other nearby wooded areas.

Russsell Bretherton (1939, 1940) provides the first, and to date only, annotated systematic listing of the macro-lepidoptera of the Oxford District, which he defines as the area within a 10 mile radius of the centre of Oxford. This detailed work is methodical, with an excellent introduction, and gives every impression that it comprehensively summarises what was known on the subject at the time it was written. Five hundred and fifteen species of macro-moths had been recorded in this area with certainty and 33 additional species more doubtfully. Bladon Heath Wood is only six miles north-west of Oxford, so well within this area. It is mentioned only once in the entire listing. Bretherton records that the Green Arches *Anaplectoides prasina* (D.&S.) was found at "Bladon Heath" by Professor E. G. R. Waters. Waters was actively exploring the Oxford District in the 1920s and produced a list of the micro-lepidoptera (Waters, 1929). Woodstock is the nearest small town to Bladon Heath Wood and only a mile or two further from Oxford, and is mentioned frequently because Claude Rippon lived and collected there and generated many moth records.

Maitland Emmet (1947), in his supplement to Bretherton's list, does not mention Bladon Heath or Bladon Heath Wood at all, even though at some point between 1940 and 1960, but presumably after his list of 1947, we know that he visited the site at least once, as per his Monks Wood BRC card.

The account of moths in the Victoria History of the County of Oxford (see Walker & Hobby, 1939) does not mention Bladon Heath Wood at all. "Bladon" is mentioned for the Maiden's Blush *Cyclophora punctaria* (L.). This record is drawn from a manuscript list for the Oxford area prepared by W. Holland and A. H. Ham in approximately 1905 and this record is repeated in Bretherton's list.

The field meeting reported here was both a trip down memory lane for the leader and an example and a reminder of just how much woodland can change in 40 years. When I first explored Bladon Heath Wood in the mid-1970s, the section of the bridleway which runs along the north-eastern edge of the wood, and which links the villages of Bladon and Begbroke, was often wet and boggy and difficult to use, especially in the winter. This is still the case. It is low-lying and on impermeable clay. But the track which runs from this bridleway and heads up the hill to the landscaped water tank in the centre of the wood was often parched and cracked. Scattered bushes of Gorse *Ulex europaeus* L. grew along the sides of this track. On the Bladon side of the track there was an open vista with a few scattered Oak trees *Quercus robur* L. with thin trunks, and some clumps of willows including Goat Willow *Salix caprea* L. and Grey Willow *S. cinerea* L.. The track looked heath-like and the open area resembled an East African savannah! This was no doubt the result of a recent clear-felling of timber or control of scrub. In this situation I recall searching and beating the willows for the caterpillars of moths, and finding those of the Herald moth *Scoliopteryx libatrix* (L.), Clouded Border *Lomaspilis marginata* (L.) and Common

Wave *Cabera pusaria* (L.), with smaller numbers of the Vapourer *Orgyia antiqua* (L.), and Miller *Acronicta leporina* (L.) amongst others. My diary for my first year in the wood, 1976, records me finding five small caterpillars and some hatched eggs of the Sallow Kitten *Furcula furcula* (Clerck) on Goat Willow. I also remember dusking along the bridleway with a net and finding frequent geometrids, including the Silver-ground Carpet *Xanthorrhoe montanata* (D. & S.), Green Carpet *Colostygia pectinataria* (Knoch), Brimstone *Opisthograptis luteolata* (L.) and Yellow Shell (L.). On at least one occasion in the late 1970s or early 1980s, I recall taking an actinic trap along the bridleway and operating it there on a motorcycle battery for a few hours. I remember also hearing and seeing Woodcock *Scolopax rusticola* L. roding high over the trees alongside this track and through the cleared area. These birds were present every year throughout the late 1970s.

I shared my interest in the natural history of Bladon Heath Wood with John Campbell of the local Biological Records Centre, then at Woodstock Museum where he was curator. He became interested in recording invertebrates there and made a series of day-time visits over the years 1981–1992. These visits produced relatively few records of moths, including the Cinnabar *Tyria jacobaeae* (L.), Brown Silver-line *Petrophora chlorosata* (Scop.) and Vapourer but more of other Orders of insects.

At the start of the 1980s, an additional clear-fell was created, on the Begbroke side of the track up the hill to the water-tank. This clearing was also planted with young trees, including conifers. I searched this newly opened area for Pearl-bordered Fritillary butterflies *Boloria euphrosyne* (L.) for a survey organised by Butterfly Conservation, on 9 June 1985, at which date the newly established planting of conifers was two years old. I found none, even though I had seen Pearl-bordered Fritillaries in nearby Bernwood Forest earlier that day. In all my visits to Bladon Heath Wood since my first in the spring of 1976, I do not recall ever seeing any Fritillary butterflies there. I assumed they had been present but were lost years before when active coppicing and other working of the wood had ceased and the trees were left to mature. The most noteworthy butterfly species resident in Bladon Heath Wood was not discovered until 2003, when Stuart Hodges found a population of the Black Hairstreak *Satyrium pruni* (L.).

In the 1980s and 1990s I made occasional return visits to Bladon Heath Wood, but I was living in Africa at the start of the 1980s and from 1987 I was living in parts of the UK a hundred miles away from this woodland, so visits were few. In 1996 I operated a Robinson trap in the wood for the first time, on 5 July, from dusk to 1.00h, with Martin Townsend, whom I had encouraged to obtain permission for operating a light trap in the wood that season because he had the interest and the time available. Martin had the advantage on me that he lived locally. We operated a Robinson light-trap at SP 454 142, in the corner of the 1970's clear-fell in which woody regrowth was now well underway. The most noteworthy result was the capturing of quite a number of the Plain Wave *Idaea straminata* (Borkh.). Martin had already started some moth-trapping on the site, on 23 March, 6 and 16 June in 1996 and conducted one more session after my visit, on 12 July 1996. Amongst the more interesting of the 15 species of macro-moths recorded on 23 March were the Yellow-horned *Achlya flavicornis* (L.), Small Brindled Beauty *Apocheima hispidaria* (D. & S.) and the Twin-spotted Quaker *Orthosia munda* (D. & S.). Of some note amongst the 60 species of macro-moths on 6 June were Oak-tree Pug *Eupithecia dodoneata* Guen., Satin Wave *Idaea subsericeata* (Haw.), Grass Rivulet *Perizoma albulata* (D. & S.), Seraphim *Lobophora halterata* (Hufn.), Brindled White-spot *Parectropis similaria* (Hufn.), Pale Oak Beauty *Hypomecis punctinalis* (Scop.), Marbled Brown *Drymonia dodonaea* (D. & S.), Alder Moth *Acronicta alni* (L.), Bird's

Wing *Dypterygia scabriuscula* (L.) and Marbled Coronet *Hadena confusa* (Hufn.). Of the 64 species recorded on 16 June, the most noteworthy were Grey Birch *Aethalura punctulata* (D. & S.), Bordered White *Bupalus piniaria* (L.), Large Nutmeg *Apamea anceps* (D. & S.), Lobster *Stauropus fagi* (L.) and the Bird's Wing again. Only 36 species of macro-moths were recorded on 5 July, including the Maiden's Blush, Plain Wave, the Satin Wave again, and the Green Arches. Eighty-two species of macro-moths were recorded on 12 July, including the Plain Wave again (about 20 individuals this time), Blotched Emerald *Comibaena bajularia* (D. & S.), Satin Beauty *Deileptenia ribeata* (Clerck), Barred Red *Hylaea fasciaria* (L.), Lackey *Malacosoma neustria* (L.), Scarce Footman *Eilema complana* (L.), Blue-bordered Carpet *Plemyria rubiginata* (D. & S.), Marbled Brown, Bird's Wing again and Beautiful Hooktip *Laspeyria flexula* (D. & S.).

John Campbell recorded a few more common species by day on 7 June 1997 and 5 September 1998.

On 8 May 1999 J. Baker and Sam Bousanquet recorded 42 species of macro-moths including the Scarce Umber *Agriopis aurantiaria* (Hübn.) and Feathered Thorn *Colotois pennaria* (L.) (as caterpillars), Water Carpet *Lampropteryx suffumata* (D. & S.), Streamer *Anticlea derivata* (D. & S.), Oak-tree Pug and Least Black Arches *Nola confusalis* (H.-S.).

We also became aware that Martin Corley had conducted a certain amount of moth recording in the wood in 1993. Corley (1994) reports the discovery of the Golden-rod Pug *Eupithecia expallidata* Doubl. from Bladon Heath on 22 July 1993, which was a first county record for Oxfordshire. Corley notes that the larval foodplant Golden-rod *Solidago virgaurea* L. was absent from the site at this time but that an alternative host-plant, Common Ragwort *Senecio jacobaea* L., was plentiful. Martin Corley recorded a total of 114 species of macro-moths from the wood in 1993, according to a list received from Graham Hawker at the Thames Valley Environmental Records Centre (TVERC) in March 2015. Some of the more noteworthy or interesting species in a local context are the Leopard Moth *Zeuzera pyrina* (L.), Small Yellow Wave *Hydrelia flammeolaria* (Hufn.), Small White Wave *Asthena albulata* (Hufn.), Yellow-barred Brindle *Acasis viretata* (Hübn.), and Suspected *Parastichtis suspecta* (Hübn.) – all often occurring in small numbers locally, and the Slender Pug *Eupithecia tenuiata* (Hübn.) and Satyr Pug *E. satyrata* (Hübn.) – both widespread and fairly frequent but often over-looked, and the Small Waved Umber *Horisme vitalbata* (D. & S.) – dependent on Traveller's Joy *Clematis vitalba* L. – a plant of calcareous situations.

In 1997 I organised the first BENHS field meeting in the wood. This took place on 7 June 1997, with Martin Townsend co-leading. The results seem to have escaped being published in the British Journal of Entomology and Natural History and, surprising, there is not even a brief account in my Moth Report of the period in British Wildlife magazine. We organised a second BENHS field meeting on 5 September 1998, the results of which were never published in BJENH though a very brief note in British Wildlife records that Hornets *Vespa crabro* L. were so numerous at one of the light traps that the trap had to be moved to another place in the wood (Waring, 1998). We found that there was a nest of Hornets in a hole in the base of a mature Ash tree *Fraxinus excelsior* L. by the trap. The catches in the traps on this September meeting were rather small, due in part to a clear sky with a full moon visible throughout the evening session (we did not stay overnight). The most interesting moths observed were a Grey Shoulder-knot *Lithophane ornitopus lactipennis* (Dadd) found by hand-held light by Warren Gilchrist, and the Ash-dependent Centre-barred Sallow *Atethmia centrago* (Haw.) and the Feathered

Gothic *Tholera decimalis* (Poda) in our light-traps, both the latter being well-distributed in the Oxford area, and generally in southern England. The night was moonlit, calm and very pleasant but not a good one for moths. We trapped from dusk until 22.00h, by which time there was little moth activity. I recall that this BENHS field meeting was one of very few my mother was ever able to attend, and she very much enjoyed it. Sadly she died of cancer just short of two years later.

There does not appear to have been any recording of moths in Bladon Heath Wood from 2000 onwards until this field meeting of 20 June 2015.

Forty years after my first visits we find that all those young trees planted into the clear-fells, along with self-sets, have grown up and both plantations are full of tall trees, packed almost solidly, with foliage all coalesced to form one continuous tree-canopy, and with very little understorey and ground-layer vegetation below. With this blanket holding in the moisture, the ground remains wetter for longer, after any downpour (Fig. 1).

Unfortunately, there was some heavy rain during the afternoon before the 20.00h start of this meeting. This was well-underway at 18.00h when some of us met up at the White House pub in Bladon for a hot meal, but it had reduced to just occasional light drizzle by the start. My wife Rachel and daughter Kirsty were joined by Mary Elford for the pub meal, then the four of us met up with Paul Black at the entrance to the wood, as arranged. The rain had finished completely by 22.00h, by which time our four lights were set up and switched on. Unfortunately, the rain deterred at least two other locally-based moth-trappers from joining us. The air temperature was 15°C at dusk, falling to a minimum 13°C during the night. There was 100% cloud all night and the new crescent moon was not visible. Regrettably a cool, blustery wind persisted throughout the night. The results showed that this reduced the catches in the two open areas where the leader had to establish a tented camp for his family, by the water-tank enclosure. Options for pitching a tent were minimal elsewhere because the trees were densely packed and growing right to the edges of the rides. The leader

Fig.1. The hill track in Bladon Heath Wood, Oxfordshire, 2015. Photo: P. Waring.

used two standard Robinson traps fitted with 125W MB/U bulbs and protected these from rain using 9-inch diameter Pyrex glass bowls inverted and supported on the four baffles of the entrance funnel by the flanges in the baffles provided for this purpose. One trap, which will be referred to as the Plantation Bay Trap, was sited at SP 45608 14024 (±7m) in a loading bay at the edge of a plantation of several rows of Corsican Pine trees *Pinus nigra laricio* Maire, and adjacent to many broad-leaved trees, including Sycamores *Acer pseudoplatanus* L. as well as oaks, willows, birch and other species furthermore into the stand. The second trap was placed at SP 45635 13977 (±5m) at the upper entrance to the hill track, by a gate across the track – hence Gate Trap. Paul Black was able to get his two lights down into much more sheltered positions on the hill-track and to rest in his car. He opted to man his lights all night and put all the moths into individual specimen pots for inspection in the morning. He set up a 125W pinkish MBF/U bulb on a support over a sheet nearly half way down the hill-track (Fig. 2). This was somewhat below the junction with a secondary track into the trees. He also set up a standard Robinson trap with 125W MBF/U bulb about 30m below this, also on the hill-track, at SP 45779 14122 (±6m).

All three light traps, and the light over the sheet, were operated all night. The traps were closed up after dawn, by 5.00h, for inspection, recording and release of the catches.

The highlight of the night was a single and immaculate Red-necked Footman *Atolmis rubricollis* (L.) captured in the Plantation Trap. Forty years ago this was regarded as a great rarity in this area, and it is still a noteworthy capture. This appears to be the first ever to have been recorded from Bladon Heath Wood. Bretherton (1939) considered it "Local and scarce, with no recent records since the first in 1857, in Stow Wood, and others in Bagley Wood between 1900–1905". But since the 1970s the species has undergone an expansion in range northwards from the south, especially in western England and Wales. It has been found to breed on algae

Fig. 2. Paul Black inspecting the sheet of his portable light for moths, Bladon Heath Wood, Oxfordshire, 2015. Photo: P. Waring.

growing in abundance on the trunks and branches of maturing conifers in plantations. From the 1950s onwards many such plantations were established within lowland woodlands of native broad-leaved trees. The increase in occurrence and numbers of the Red-necked Footman coincides with the maturation of these plantings, an increase in the abundance of various lichens and algae on trees since the Clean Air Act of 1956, and an increase in average temperatures in recent decades, all of which are likely to favour this moth. Comparison of the national distribution maps for this species in Heath & Emmet (1983) and Hill *et al.* (2010) shows in more detail how the distribution of this moth has changed substantially. None of the above sources have previous records of the moth from Bladon Heath Wood. But it may not be resident. During late June and July 2015 the Red-necked Footman was recorded in large numbers as suspected immigrants – often in habitats with which the species is not normally associated, and in locations which have been intensively light-trapped for years without producing any previous records of this moth (Waring, 2015a). Further light-trapping or searches for larvae are necessary to reveal whether there is an established population of this moth in Bladon Heath Wood.

The total catches of the Plantation Trap and the Gate Trap were only 55 macro-moths of 15 species and 40 macro-moths of 16 species respectively, however, compared with 133 macro-moths of 36 species in the much more sheltered Ride Trap. The substantial reduction in catch size (to less than 50%) in the open areas by the water tank can be explained as a combination of the effect of the wind and the expected lower moth productivity of the grassed area occupied by the watertank.

Another highlight of the catches was the Orange Footman *Eilema sororcula* (Hufn.) – another first for Bladon Heath Wood. This species never turned up in any of my traps in the woodlands I worked around Oxford in the 1970s and 1980s, and was not recorded by Messrs Corley or Townsend when light-trapping in Bladon Heath Wood in the 1990s. There are no records for the wood from any previous decades. Bretherton (1939) records the moth as local and rather scarce in the Oxford District, and gives four localities. These are prior to the mass fellings during and immediately after the Second World War. Since 2000 the Orange Footman has expanded its national distribution hugely, and it now appears to be resident in many woodlands and scrubby areas where it is has not been recorded previously, despite much light-trapping. On 20 June 2015 we saw eight Orange Footman each at both of Paul Black's lights in the more sheltered locations. The species is clearly well established here now.

Other particularly noteworthy moths in the context of Bladon Heath Wood and the surrounding area, with brief comments, including observations from the Provisional UK Atlas (Hill *et al.*, 2010) are:

Marbled Brown *Drymonia dodonaea* (D. & S.) – still a localised and thinly scattered species in central England, though recording since 2000 shows the species to be more densely distributed to the south, east and west. Mainly associated with long-established lowland broad-leaved woodland.

Plain Wave *Idaea straminata* (Borkh.) – discovered to be numerous in Bladon Heath Wood during our light-trapping of 5 July 1996, and then again on 12 July 1996. I was pleased we were able to record two individuals on this visit, in the same part of the wood as previously. Now additional trapping is needed to establish how widespread the Plain Wave is in this wood, to advise management.

It was good to see the Scalloped Shell *Hydria* (*Rheumaptera*) *undulata* (L.) which I discovered here in the 1970s, and the Puss Moth *Cerura vinula* (L.) and the Poplar Grey *Subacronicta megacephala* (D. & S.) also from the willows.

Other welcome species we saw were the Small Yellow Wave *Hydrelia flammeolaria* (Hufn.), Treble Brown-spot *Idaea trigeminata* (Haw.), Lobster *Stauropus fagi* (L.), Green Arches *Anaplectoides prasina* (D.&S.) (as did Prof. Waters in the 1920s!), Marbled White-spot *Deltote pygarga* (Hufn.) , Scorched Wing *Plagodis dolabraria* (L.), Green Silver-lines *Pseudoips prasinana* (L.), and Heart & Club *Agrotis clavis* (Hufn.).

The leader would like to thank all who attended this meeting, especially Paul Black who brought his own trapping equipment, manned it most of the night, and made a substantial impact on the results by getting his lights into the more sheltered sites. The leader also thanks Roy Cox, who is Rural Enterprises Manager in the Estate Office of Blenheim Palace, for permission to hold this meeting, and Johnny Boscher who is the gamekeeper. Amazingly Johnny has been the keeper continuously since the late 1970s when the keeper I had known in 1976, Dick Carter, retired. I am delighted that the British Entomological and Natural History Society have received permission for a further field meeting in 2016. My intention is that we may be able to adopt the wood for field meetings over the next five years, visiting in a different month each year, just as we did for two other sites in Oxfordshire in recent years – the Rushy Meadows SSSI, and Otmoor SSSI, the results of which are all published in this journal.

While compiling this account of the Lepidoptera of Bladon Heath Wood the opportunity has been taken to report on the unusual behaviour of moles in the wood during the dry summer of 1976 (Waring, 2015b).

References

Bretherton, R. F. 1940. A list of the macro-lepidoptera of the Oxford district. *Ashmolean Natural History Society – Proceedings and Report for 1939*: 25–69.

Bretherton, R. F. 1941. Additions to the list of the macro-lepidoptera of the Oxford district. *Ashmolean Natural History Society – Proceedings and Report for 1940*: 22–23.

Corley, M. 1994. In: 1993 Annual Exhibition Report – British Macrolepidoptera. *British Journal of Entomology & Natural History* **7**: 150.

Emmet, A. M. 1947. Second supplement to the list of macro-lepidoptera of the Oxford district. *Ashmolean Natural History Society – Proceedings and Report for 1941–47*: 47–55.

Heath, J. & Emmet, A. M. 1983. *The moths and butterflies of Great Britain & Ireland.* Volume 9: 85. Harley. Colchester.

Hill, L., Randle, Z., Fox, R. & Parsons, M. 2010. *Provisional atlas of the UK's larger moths.* Butterfly Conservation. Wareham.

Steed, V. 1964. Burleigh Wood in Bladon and Cassington. Top. Oxon. – *A Bulletin of Oxfordshire Local History* **11**: 3–4.

Turrill, W. B. 1959. *British Plant Life.* New Naturalist. Collins. London.

Walker, J. J., 1926. *The natural history of the Oxford district.* Oxford University Press.

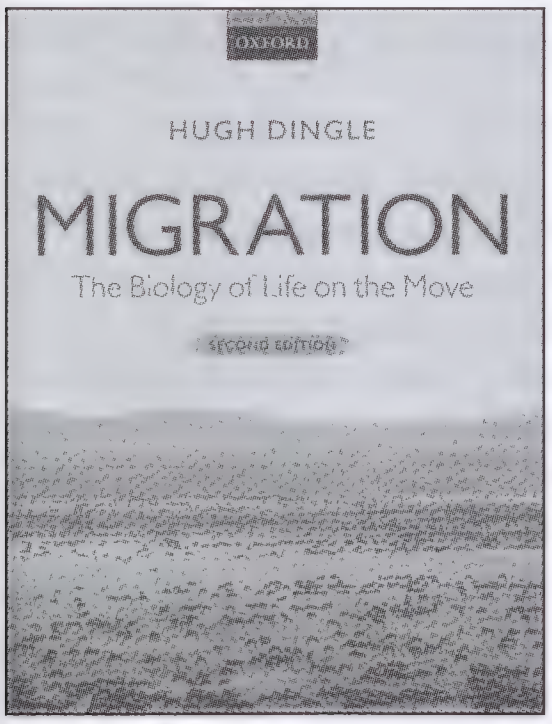
Walker, J. J. & Hobby, B. M., 1939. Lepidoptera. *Victoria History of the County of Oxfordshire* **1**: 82–106.

Waring, P. 1998. Wildlife reports – Moths. *British Wildlife* **10**: 54–56.

Waring, P. 2015a. Wildlife reports – Moths. *British Wildlife* **26(6)** in press.

Waring, P. 2015b. Some observations on the behaviour of moles *Talpa europaea* L. during the exceptionally dry summer of 1976. *British Journal of Entomology and Natural History* **28**: 131–132.

Waters, E. G. R. 1929. A list of the Micro-lepidoptera of the Oxford district. In: *Proceedings and Report for 1928*. Ashmolean Natural History Society of Oxford. 72pp.



BOOK REVIEW

Migration: The Biology of Life on the Move by Hugh Dingle. Second edition (Oxford University Press, 2014). 326 pp. Softback £29.95. ISBN 978-0 - 19-964039-3.

When the phrase 'insect migration' is mentioned two thoughts come to mind: first, warm southerly winds blowing from the continent mean lots of migrant moths will be flying and it will be interesting to record what species are on the move; second, what have been the continental climatic and biotic factors of the past year regulating insect development and population size and thus the numbers likely to participate in long distance flight. Recording which migrants land where (and how many) is important in measuring the area of dispersal, and over time, whether some species are more frequent and better dispersers than others. Given time, those expanding their range may colonise and become part of our resident fauna. Being in the right place at the right time can be especially exciting when rare migrants land in quantity on your light-trap sheet: a cousin of mine for example even has a tiger moth new to the UK named after her. The other response is to investigate how and why certain insects participate in migration: do hormonal factors drive migration; are migrant insects specifically adapted for long range flight, and how?; can we learn more about migration by directly observing insects in flight using techniques such as radar than by inference from trapped samples? This book is primarily about describing the factors affecting migration rather than listing the players that do.

It is nearly 20 years since the first edition of this students' standard textbook on migration was published. As with most fields of science, our understanding of migration has advanced markedly since then with respect to new data and to conceptual understanding. Not least there was the RES Symposium on Insect Migration in 2000 organised by the author and fellow experts, including our own member Ian Woiwod.

The revision concentrates on the characteristics and evolution of migratory behaviour in relation to ecology. It is also an attempt to find common ground and to consider migration as a biological phenomenon across taxa groups (vis. insects to vertebrates). Plenty of examples from the insect world are described – moths, planthoppers, dragonflies etc., many investigated by the author. The book is divided into three main Parts: 1 – Migration and Methods for Its Study, 2 – Proximate Factors in Migration, and 3 – Migratory Life Histories ad Their Evolution.

The first chapter of Part 1 is fairly intense as it struggles to find the perfect definition of migration and to explain how this differs from ordinary dispersal. The term dispersal is most often used for presumptively one-way movements and applied to individuals moving to breeding locations away from the place where they were born (known as 'natal dispersal') or between two successive breeding locations or social groups ('breeding dispersal'). Lepidopterists for example sometimes describe moths of certain species as being 'wanderers' or 'stragglers', these more often than not are simply rare individuals in a population observed dispersing from core territory, a behaviour at least some must undertake in order for the species to survive in the long term. Stragglers is probably not the best descriptive term either, implying that the moths may be on their last legs, when in fact they are flying pretty well and

may still be capable of dispersing tens of kilometres. Such terms tend to be applied to species that are obviously out of their core territory such as saltmarsh moths flying inland and less frequently, for example, to woodland moths dispersing across open landscapes which is likely to happen more often owing to sheer numbers of species involved, though the situations are probably similar. True migration is more complex and involves six characteristics that distinguish it from other forms of movement: (1) it is persistent over years; (2) it is straightened out relative to other movements; (3) it is undistracted by resources that would ordinarily halt it (e.g. food); (4) it is triggered by surrogate cues and is pre-emptive; (5) there are distinct departing and arriving behaviours; and (6) energy and internal resources are re-allocated to sustain it. For example moths, butterflies, leafhoppers, planthoppers and aphids in migratory mode, although undoubtedly hungry, will reject food and continue flying until further cues indicate migration is coming to an end and the need to replenish energy resources.

The migratory behaviour of moths and butterflies is discussed in detail in various chapters with many examples familiar to us such as Painted Lady, Red Admiral, Silver-Y, Large Yellow Underwing and *Plutella xylostella*; data compiled by UK lepidopterists and Rothamsted researchers using techniques such as vertical-looking radar. Several species are able to select favourable high altitude winds, flights occurring regularly up to a few hundred metres and even up to 1km above ground. Data show that migrating noctuid moths can occasionally outcompete birds for speed (15.7m/s *vs.* 13.1m/s) but fly much lower (200–800 *vs.* 400 to 1,400–3,600m above ground level) because of temperature constraints. The directions taken by migrating insects are controlled far more by prevailing winds than those of birds which although also hitching a ride are capable of taking an independent course if conditions dictate.

Part 2 includes chapters on Migration, winds and currents, Physiology of migration, Biomechanical and bioenergetic constraints on migration, and Orientation and navigation. A lot of fascinating research has been carried out to elucidate the role of the brain, central nervous system and endocrine system of insects influencing migration. For example in the Monarch butterfly, juvenile hormone (JH) is responsible for the post-eclosion growth of the reproductive tracts of both sexes under long-day conditions. In those entering adult diapause late in the summer period prior to migration, the reproductive tracts are reduced, a reduction accompanied by a two orders of magnitude decline in JH activity. With sex off the menu, these individuals are much better able (fitter, more focused?) to undertake long range migration.

Flight, and especially long distance flight in insects, requires fuel mobilisation to sustain it. Goldsworthy and colleagues in the UK have shown that in acridids, flight is initially fuelled by carbohydrates, but then as it proceeds, by diaglycerols mobilised from stores of triaglycerol in the fat body. This second phase, so crucial to long distance migration, is promoted by adipokinetic (AKH) hormones – these were discovered by Mordue and colleagues at Imperial College and Aberdeen University, another UK triumph, though many others were involved.

Part 3 covers Seasonal migration patterns, Migration to special habitats, Migration under ephemeral conditions and Behavioral and life-history variability in migration.

All in all, the author has produced an excellent book about migration, and by covering other important groups such as birds and mammals provides a broader, more balanced analysis of the processes of large scale animal movement than would be the case if the subject were confined just to insects. I can certainly recommend the book to those members who have a special interest in insect migration.

JOHN BADMIN

THE SOCIETY'S PUBLIC LIABILITY INSURANCE

In 1997 the Society extended its third party liability insurance for cover in respect of official Society events to include field work carried out by members as part of their personal activities. It was expected that this would cover the insurance obligations, which accompany applications for collecting and recording permits in many cases.

The Society has received a number of queries regarding the scope of the cover provided and this notice will hopefully clarify the position.

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Cover photograph: The Tree bumblebee *Bombus hypnorum* (L.), Hurst Green, Oxted, Surrey, 4.vi.2009. Photo: Nick Withers.

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IS *BOMBUS HYPNORUM* (HYMENOPTERA: APIDAE) BECOMING THE DOMINANT EARLY-SEASON BUMBLEBEE? A BACK-GARDEN STUDY IN EAST DEVON

C. R. Betts

23, Devonshire Place, Exeter, Devon EX4 6JA

Abstract

Numbers of seven bumblebee species were counted hourly over an 8-day period at eight counting stations in a small rural garden in Broadclyst, Devon during spring 2014. Despite expectations, the newcomer *Bombus hypnorum* (L.) which has substantially increased its range westwards in England in recent years was not the most abundant species, the commonest in this study being *B. pascuorum* (Scopoli) and *B. pratorum* (L.). Reasons for the relative abundance of the bumblebee species are discussed.

Introduction

Since *Bombus hypnorum* (L.) was first thought to be established in the UK (Goulson & Williams, 2001) it has rapidly spread into the south-west. In May and early June 2014, observations of bumblebees in the Exeter area (specifically on the University Campus, and five miles east in the village of Broadclyst) suggested *B. hypnorum* might be the most frequently observed species in the area. If true, this would be a dramatic change in local bumblebee diversity in just a few years.

The rise of *B. hypnorum* has been well documented (BWARS, 2014a; Crowther, Hein & Bourke, 2014) and some of the characteristics of its expansion and possible implications have been considered (e.g. Crowther, Hein & Bourke, 2014; also Jones & Brown, 2014). The general conclusions have been that *B. hypnorum*'s successful range expansion is due largely to its ability to exploit under-utilised nesting areas (i.e. mostly aerial) and its particular preference for woodland and urban habitat types (Crowther *et al.*, 2014: see the sections on "Foraging predictors" and "Landscape preferences"), and despite lower genetic diversity and relatively higher parasite burdens (Jones & Brown, 2014). These studies have been restricted to the south-east and east of the UK where this species was first recorded and has since become firmly established (BWARS, 2014a). This study examines the situation in the south-west corner of *B. hypnorum*'s range, close to its leading edge of the last five years (original observation supported by BWARS distribution data).

If this invading species really has become dominant in this region in such a short space of time, questions might be considered about (a) the impact of *B. hypnorum* on native species with small colony sizes/short nesting periods and on native species at the edges of their distribution range; (b) what this might mean for bumblebee pollination services if the dominance of one species has led to the decline of others; (c) how *B. hypnorum* has been so successful in such a short period of time and the ecological drivers/enablers of this success.

An opportunity to test the situation arose in June 2014 in the form of a more rigorous record of observations of bumblebee species in the author's rural garden in East Devon. The area surveyed covered approximately 0.04 hectares and consisted of a range of flowerbeds, banks and a hedgerow arranged primarily around its perimeter (see Fig. 1). Ten of the 24 UK species of bumblebee (Williams, 2014) have been recorded regularly in this area since 2005: *B. hypnorum* (L.), *B. pratorum* (L.);

B. pascuorum (Scopoli); *B. lapidarius* (L.); *B. terrestris* (L.); *B. lucorum* (L.); *B. jonellus* (Kirby); *B. hortorum* (L.); and the social "parasites" *B. sylvestris* (Lepeletier) and *B. vestalis* (Geoffroy).

In 2012 and 2013 all of these species were regular visitors to the garden although the relative abundance of each was not measured. In June 2014 nests of *B. pratorum*, *B. lucorum* and *B. hypnorum* were recorded within the boundaries of this area. Of the B. *hypnorum* nests one was aerial (in a first floor loft) and one appeared to be subterranean: the entrance was under the corner of a composting frame, 1m from a nest of *B. pratorum* that occupied a disused field mouse nest on the other side of the frame. Together the total nest density appeared to be exceptional and was far greater than the mean density recorded by Osborne *et al.* (2008) (i.e. 4 nests compared with Osborne *et al*'s estimate of 1.44 nests in an equivalent area). Spot observations of the numbers of *B. hypnorum* workers in the immediate area appeared to far exceed those of all the other species usually seen.

Methods

Eight counting stations were identified in a clockwise path around the perimeter of the author's rural garden in East Devon (shown in Fig. 1).

Each station was usually dominated by one or two flower species with a varying aspect and separated by either open lawn or by low, non-flowering shrubs (i.e. the stations were not contiguous). Each station is characterised in Table 1.

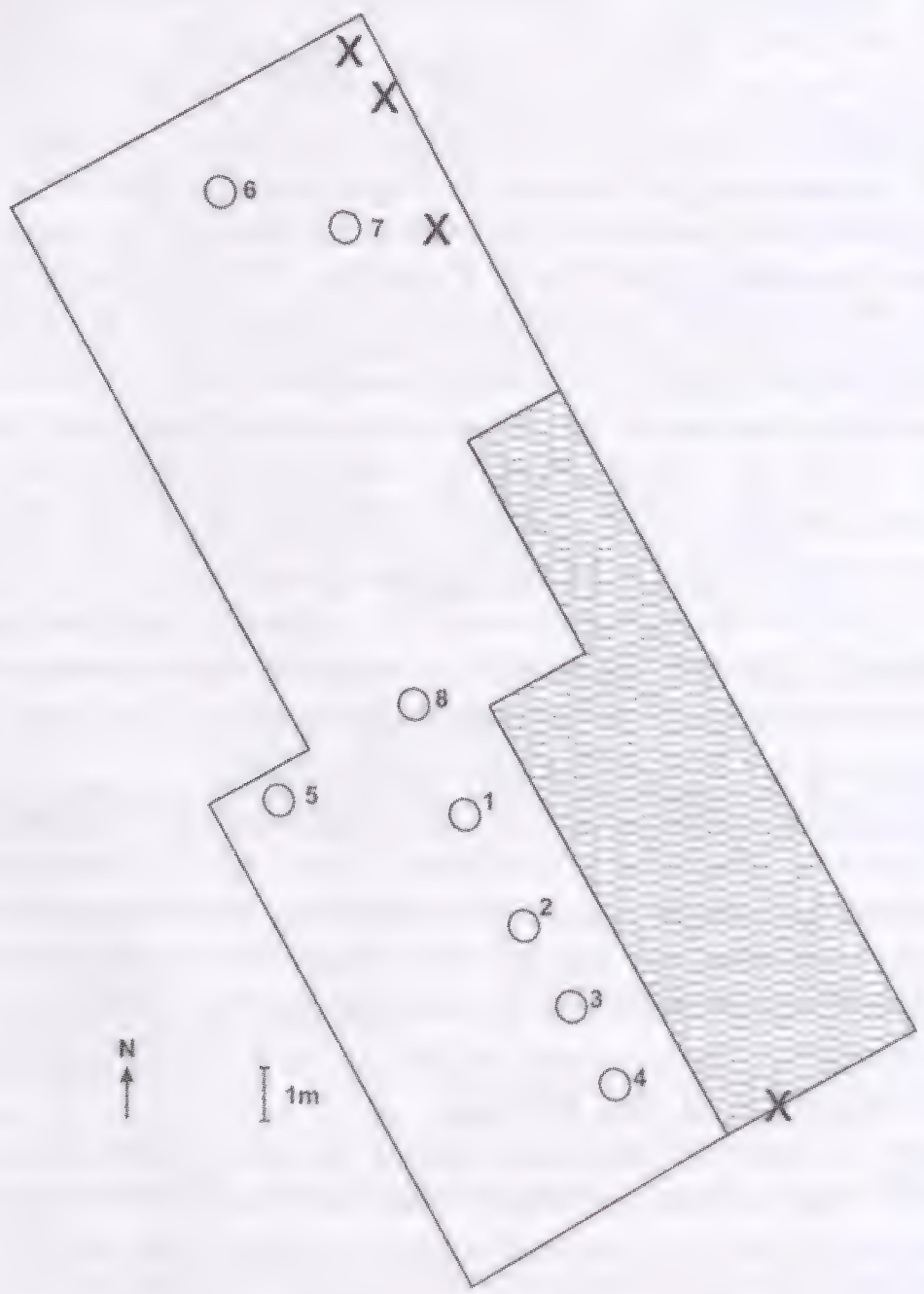

Figure 1. Bumblebee observation stations around the study site, Broadclyst, Devon, 2014. X = nest locations; numbers show observation sites; hatched area = building.

Table 1. Descriptions and flower composition of observation stations in the study area, Broadclyst, Devon, 2014.

Station	Dominant flower + others at the station	Aspect
1	Lavender (*Lavendula sp.*) + Common Mallow (*Malva sylvestris*)	Flowering easterly, shaded by other shrubs
2	Common Mallow	Open aspect, direct sun, unshaded
3	Catmint (*Nepeta* sp.) + Common Mallow	Flowering easterly, un-shaded but overhanging flowers
4	Green Alkanet (*Pentaglottis sempervirens)*	Southerly aspect, direct sun until late afternoon (after counting period)
5	Common Mallow and poppies (several cultivated species of *Papaver*)	Southerly aspect shaded on northern aspect
6	Poppies	Open aspect, direct sun
7	Green Alkanet	Southerly aspect, shaded by other shrubs
8	Common Mallow + Green Alkanet	Open aspect, direct sunlight

Each station was visited via the same route on the hour from 09.00h each day for nine consecutive hours over a period of eight consecutive days of fairly consistent sunny weather (14.vi.14 and 23.vi.14). At each station all the bumblebees were recorded that were visiting all the plants within the boundaries of the station (i.e. where the flowering plants stopped) for a maximum of one minute. This was to minimise double-counting at each station.

The bee numbers were sufficiently low to enable the author to identify each specimen seen and make sure that this bee was not then re-counted at the next station by watching the flight paths of each bee counted. The distance between each station enabled quick movement between stations whilst preventing mixing of bees between them. Males, workers and queens were recorded together as it was not practically possible (when foraging) to quickly and reliably differentiate males from workers or small queens from large workers in *B. pascuorum*, *B. hypnorum* and *B. lucorum*.

Results

Daily totals for all seven *Bombus* species counted in the garden in Exeter during June 2014 are shown in Table 2.

Table 2. Total numbers of each *Bombus* species recorded daily for the 8 day study period at Broadclyst, Devon during June 2014.

Species/Day	1	2	3	4	5	6	7	8	Total
pratorum	12	22	36	24	19	14	7	6	142
hypnorum	16	14	7	13	9	3	4	1	68
lucorum	1	7	9	5	3	1	2	3	31
pascuorum	12	21	26	20	22	9	19	12	143
jonellus	1	0	4	4	0	2	0	3	15
lapidarius	0	1	3	3	4	1	9	7	28
terrestris	1	1	0	0	0	0	0	0	2
Sub totals	43	67	88	73	62	36	48	40	429

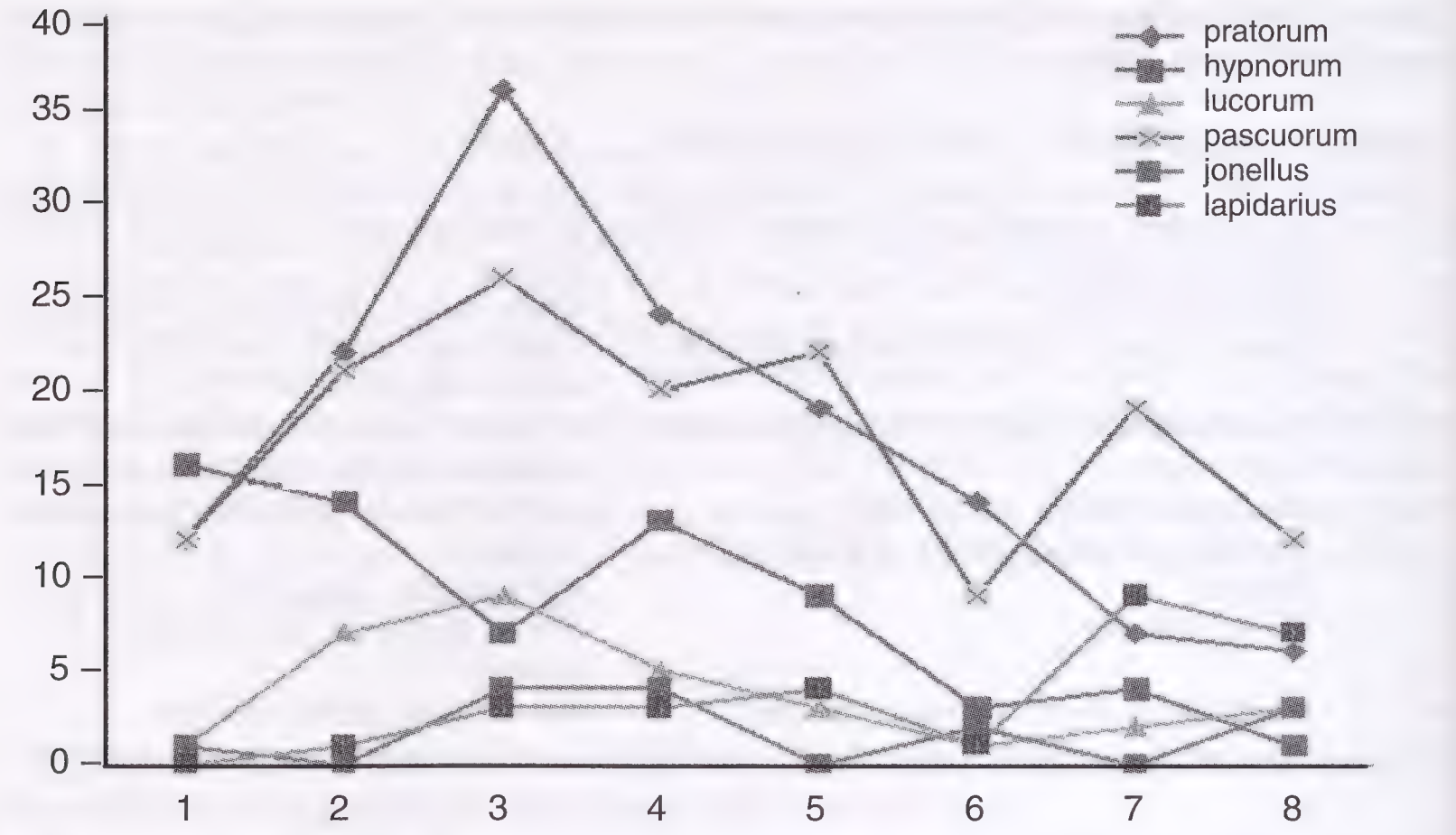

Figure 2. Totals for each *Bombus* species plotted over the eight day observational period at Broadclyst, Devon, 2014.

The data when plotted (Fig. 2) show considerable variation in abundance for each bumblebee species over the eight days. There were a variety of peaks and troughs between days for each species, with no clearly discernible pattern other than a steady decline in counts at least for some species.

The data for each species recorded at each hourly time slot was also plotted against time (Fig. 3). This plot emphasises the downward trend which was tested by fitting a regression curve. The fit of the regression curve ($r^2 = 0.4228$), however, was not significant ($p > 0.05$). The combined data for the three *Pyrobombus* species (*B. pascuorum*, *B. pratorum* and *B. hypnorum*) were then isolated from the other species data and were re-plotted to see if there was a significant decline over time for these species on their own, but the recalculated regression curve was still not significant ($p > 0.05$).

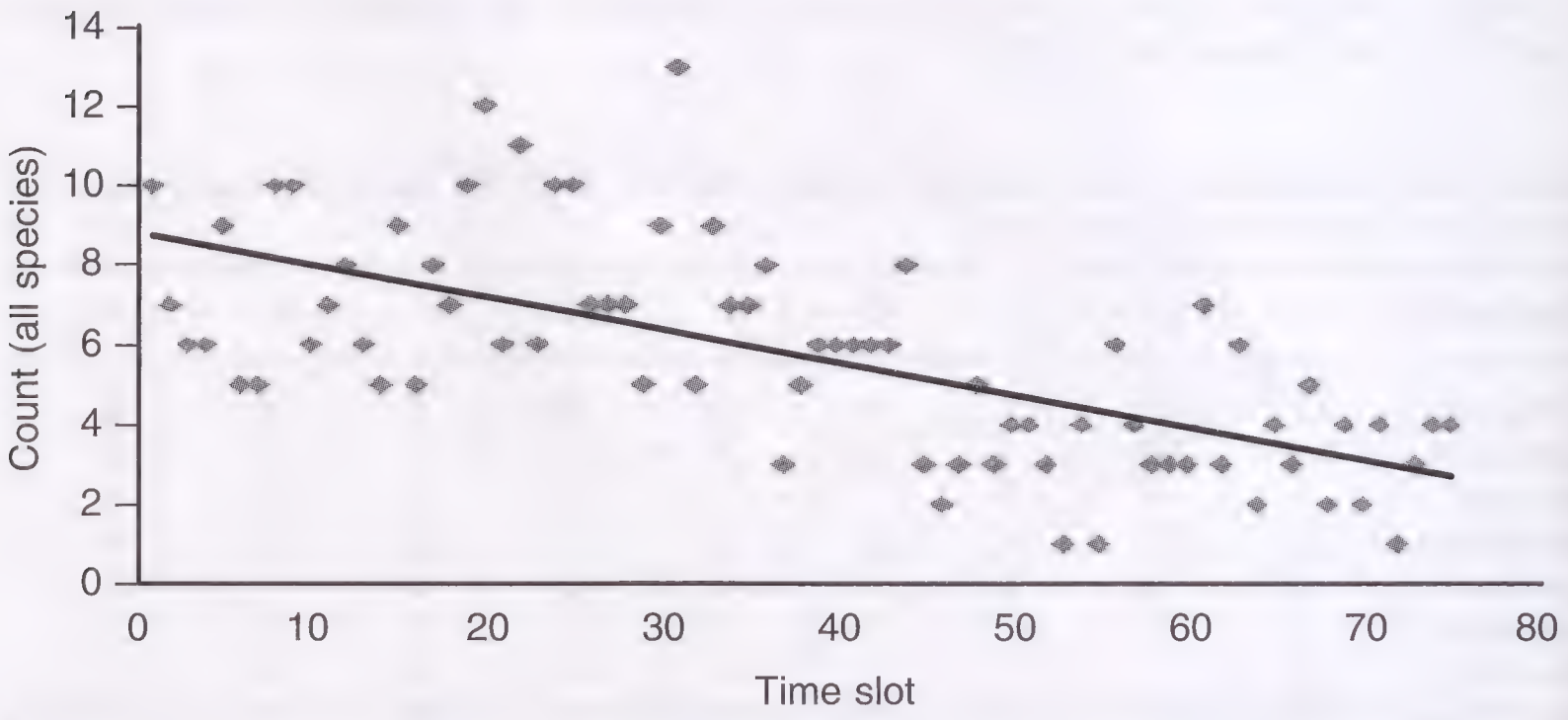

Figure 3. All observations plotted against the 75 hourly time slots in the time series.

Table 3. Proportion of *Bombus* species observed over the eight day period

Species	Percentage of total number of bees recorded
B. pascuorum	33.3
B. pratorum	33.0
B. hypnorum	15.8
B. lucorum	7.2
B. lapidarius	6.5
B. jonellus	3.5
B. terrestris	0.5

The total number of observations for each species are summarized in Table 3. It was clear that both *B. pascuorum* and *B. pratorum* were the most abundant species in roughly equal proportions with *B. hypnorum* third at half the frequency of the first two species but more than twice the frequency of the next most abundant (*B. lapidarius* and *B. lucorum*).

A simple chi-square test was carried out to see if the observed *B. hypnorum* numbers were significantly different from those expected compared to the two other most abundant species (*B. pratorum* and *B. pascuorum*). The chi-square test would reveal if *B. hypnorum* numbers were at least equal to the numbers seen of the other two most abundant species, given the numbers recorded of each species. The results showed that there was a significant difference from the numbers expected, i.e. ($\chi^2 = 16.25$ with 7 df; $p < 0.05$). Visual examination of the data clearly shows that *B. hypnorum* is less abundant than would be expected.

Discussion

The author set out to establish whether or not *B. hypnorum* was the most abundant bumblebee species in the area given anecdotal evidence that suggested this was the case. The observations during this period for this site show clearly that two other members of the subgenus Pyrobombus, *B. pascuorum* and *B. pratorum* were in fact far more abundant to roughly equal extents.

There may be reasons why this result was obtained. Firstly, when all the data are plotted there appears to be a downward trend over time (Fig. 2). The downward trend appears to be accounted for almost entirely by the reduction in numbers of workers and males of the three Pyrobombus species *hypnorum*, *pratorum* and *pascuorum,* although it was not possible to be conclusive as regression curves were not significant. These species are all early nesters and have colonies that were almost certainly in decline even this early in June so the counts may well have been substantially higher for one or more of these species just days earlier. Secondly, observations were made only on those plants in the area and one or more species may have been preferentially visiting other gardens or wild areas nearby although those species with broad flower preferences are known to be wide foragers and will exploit any extra/pollen resources (Williams, 2005). This situation may be compounded by weather factors since, although every day was dry, air temperature and wind varied considerably (it was not possible to measure objectively). Microclimatic conditions can affect foraging behaviour dramatically (Wilmer, Bataw & Hughes, 1994) and although bumblebees are far more resilient than honeybees, the impact of varying climatic conditions on observations of all the species in this study cannot be ruled out.

As mentioned above, Pyrobombus species are early nesters, giving them a resource advantage both in terms of nesting site and early flowering plants. This has been implicated in their relative robustness in the face of habitat loss and other environmental pressures (see the wider topic of global decline in bumblebees in Williams, Colla & Xie, 2008 and Williams & Osborne, 2009) and also as a factor in the success of *B. hyporum* invasions even in the face of heavier parasite burdens and greater parasite susceptibility (Jones & Brown, 2014). Another factor cited (see Crowther, Hein & Bourke., 2014) is that on the European continent *B. hypnorum* is facultatively bivoltine (i.e. can produce two colonies per season) although only recently have possible records of this occurring in the UK begun to emerge (BWARS, 2014b).

Does the robustness and success of *B. hypnorum* matter with regards to "native" species diversity? The Hymettus (Hymettus, 2010) information sheet for *Bombus hypnorum* states, "The bee has the potential to colonise the whole of Great Britain, and is unlikely to impact negatively on other species." Dohzono *et al.* (2008) note that invading *B. terrestris* had a measurable impact on plant-pollinator mutualism in Japan and other invaders can affect the population dynamics of native species through competition for both food and nesting/overwintering sites (see Jones & Brown, 2014: page 1 and Drieir *et al.*, 2014) as well as potentially vectoring disease (the latter proven specifically not to be the case in *B. hypnorum,* Jones & Brown, 2014: pages 2–3). In fact, recent studies are beginning to show that there is no such competition when considering the invasion of *B. hypnorum*. Crowther, Hein & Bourke (2014) are explicit: "Range expansion in *B. hypnorum* appears to depend on exploitation of widespread habitats under-utilised by native *Bombus* species, suggesting *B. hypnorum* will readily co-exist with these species." Specifically, *B. hypnorum* builds aerial nests in urban and semi-urban environments although this study records one subterranean nest site that was occupied by *B. hypnorum*.

Is there evidence of any other form of competition? In terms of foraging, Crowther, Hein & Bourke (2014) show that *B. hypnorum* exhibits some flower preferences and that there is a difference between these and other native species which might mean *B. hypnorum* will exploit some plants when native species do not and *vice versa*. Bates *et al.* (2011) state that *B. hypnorum* "specializes in flowers of shrub species normally found in gardens" although this may not be so important where there are wild plants readily available alongside gardens as in the current study. In the current study, all the flowering plants in the area were visited by all the species, repeatedly and for the duration of the study, suggesting there was sufficient forage for all the bees observed. Given the relatively small sampling area this study may not be representative of the bigger picture and the foraging picture is almost certainly more complex than such a small study can cover. For instance, records of flower visits do not necessarily reflect the presence of two, large *B. hypnorum* nests (judging by the numbers of males "swarming" around the nest entrances towards at the end of June) within the study site. Presumably foragers from both nests were successfully foraging outside the study site, impacting on the relative numbers observed within the site. Indeed, at the time, although it would have been possible to observe workers flying from the nests this was not done and consequently it is not possible to be sure whether *any* of the foragers seen came from the two known nests.

Conclusions

If nothing else, this study suggests observation bias (i.e. believing *B. hypnorum* to be more abundant so it was more likely that another of the same species would be

preferentially observed) is most likely to be responsible for the original thesis of *B. hypnorum* dominance. The reduction in colony size cannot be ruled out as a factor in the results but, given that all three species of Pyrobombus were declining at similar rates, the relative numbers still do not support the original postulate.

Whatever the true situation, some impact on native species and the pollination services they provide is possible, especially if nesting sites for later-season species are being used by *B. hypnorum*, despite this being a rare situation judging from the literature. Competition for food resources is unlikely to be critical given the generalist nature of *B. hypnorum* foraging and its concentration in urban and semi-urban areas. However, as the leading edge of *B. hypnorum*'s invasion continues to extend, impacts on more vulnerable species already at the edges of their own distribution or under pressure from habitat loss or fragmentation may become more significant (see Williams, Colla & Xie, 2008 for contextual discussions on this topic).

References

Bates, A. J., Sadler, J. P., Fairbrass, A. J., Falk, S. J., Hale, J. D. & Matthews, T. J. 2011. Changing Bee and Hoverfly Pollinator assemblages along an Urban-Rural Gradient. *PLoS ONE* **6**: e23459. doi:10.1371/journal.pone.0023459.

BWARS 2014a. http://www.bwars.com/index.php?q=bee/apidae/bombus-hypnorum. Accessed 2nd February 2015.

BWARS 2014b. BWARS discussion forums (BWARS@yahoogroups.com)

Crowther, L. P., Hein, P. L. & Bourke, A. F. G. 2014. Habitat and Forage Associations of a Naturally Colonising Insect Pollinator, the Tree bumblebee *Bombus hypnorum*. *PLoS ONE* **9**(9) e107568. doi:10.1371/journal.pone.0107568.

Dohzono, I., Kunitake., Y. K., Yokoyama, J. & Goka, K. 2008. Alien bumble affects native plant reproduction through interactions with native bumblebees. *Ecology* **89**: 3082–3092.

Dreir, S., Redhead, J. W., Warren, I. A., Bourke, A. F. G., Heard, M. S., Jordan, W. C., Sumner, S., Wang, J. L. & Carvell, C. 2014. Fine-scale spatial genetic structure of common and declining bumble bees across an agricultural landscape. *Molecular Ecology* **23**: 3384–3395.

Goulson, D. & Williams, P. H. 2001. *Bombus hypnorum* (Apidae: Hymenoptera). A new British bumblebee? *British Journal of Entomology and Natural History* **14**: 129–131.

Hymettus 2010. *Bombus hypnorum* information sheet. (http://hymettus.org.uk). Accessed 2nd Februry 2015.

Jones, C. M. & Brown, M. J. F. 2014. Parasites and genetic diversity in an invasive bumblebee. *Journal of Animal Ecology*. doi: 10.1111/1365-2656.12235

Osborne, J. L., Martin, A. R., Shortall, C. R. ,Todd, A. D., Goulson, D., Knight, M. E., Hale R. J. & Sanderson, R. A. 2008. Quantifying and comparing bumblebee nest densities in gardens and countryside habitats. *Journal of Applied Ecology* **45**: 784–792.

Williams, P. H. 2005. Does specialization explain rarity and decline among British bumblebees? A response to Goulson *et al.* *Biological Conservation* **122**: 33–43.

Williams, P. H. 2014. Alphabetic List of British species. Natural History Museum (Project Bombus). http://www.nhm.ac.uk/research-curation/research/projects/bombus/_key_colour_british/alphabetic_list.html. Accessed 11th May 2015.

Williams, P. H., Colla, S., & Xie, Z. 2008. Bumblebee Vulnerability: Common Correlates of Winners and Losers across Three Continents. *Conservation Biology* **23**: 931–940.

Williams, P. H. & Osborne, J. L. 2009. Bumblebee vulnerability and conservation world-wide. *Apidologie* **40**: 367–387.

SHORT COMMUNICATION

The Undertaker Bug, *Chlamydatus evanescens* (Boheman) (Hemiptera: Miridae), denizen of urban cemeteries. – I have previously written about finding this supposedly rare insect by suction sampling stonecrop, *Sedum* spp. (Crassulaceae), in derelict areas, recording the bug as new to the vice-counties of Oxfordshire (VC23), East Gloucestershire (VC33), Berkshire (VC22), Buckinghamshire (VC24), North Wiltshire (VC7), Northamptonshire (VC32) and North Hampshire (VC12) (Ryan, 2013a, 2013b, 2015 & *in litt*). This work involved touring the countryside and visiting likely derelict areas, such as disused airfields and dismantled railway lines, identified from my Ordnance Survey maps, in the hope that they would support stonecrop. These excursion were frequently unsuccessful. However, this year I have discovered a much more reliable method for finding *C. evanescens*: visiting urban cemeteries.

On 9 August 2015, I was investigating the Hemiptera-Heteroptera of conifers in Bicester, Oxfordshire. In the town cemetery, I noticed substantial growths of stonecrop on some of the old, neglected graves. Lifting up the edge of the stonecrop mat, I saw adults and nymphs of *C. evanescens* scurrying about on the stonework underneath. Three days later, I discovered the animal again in the town cemetery of Abingdon, Oxfordshire (Watsonian Berkshire). The stonecrop here was shorter, and the bug was found by plucking the plant and shaking it over my sweep net. The four city cemeteries in my home town of Oxford were examined next, on 15th August, and where stonecrop was found, so was the bug; adding Wolvercote and Botley to my list of cemeteries which support the insect. Two days later, I took *C. evanescens* in the town cemeteries of Aylesbury, Buckinghamshire and Tring, Hertfordshire (VC20); and on the following day in Warwick, Warwickshire (VC38). My final sepulchral excursion was made on 26 August to the town cemetery of Leighton Buzzard, Bedfordshire (VC30), where both stonecrop and *C. evanescens* were found within five minutes of arrival. The records for Hertfordshire, Warwickshire and Bedfordshire are new to the County Distribution of the Hemiptera-Heteroptera (Ryan, 2014a & 2014b).

This insect does not have an English name. Given the black colouring of the adults, and that the animal is clearly common and widespread in cemeteries, I propose that it be known as The Undertaker Bug. – R. P. RYAN, 38 St John Street, Oxford OX1 2LH (email: *RobRyanBugs@gmail.com*).

REFERENCES

Ryan, R. P. 2013a. *Chlamydatus evanescens* (Boheman) (Hemiptera: Miridae) – are reports of its rarity greatly exaggerated? *British Journal of Entomology and Natural History* **26**: 105–108.

Ryan, R. P. 2013b. *Chlamydatus evanescens* (Boheman) (Hemiptera: Miridae) in Buckinghamshire, Wiltshire & Berkshire. *Entomologist's Monthly Magazine* **149**: 270-271.

Ryan, R. P. 2014a. The county distribution of the Hemiptera-Heteroptera of the British Isles, fourth edition. *Hemipterist* **1**: 38–103. [*https://sites.google.com/site/TheHemipterist*]

Ryan, R. P. 2014b. An Atlas of the Hemiptera-Heteroptera of the British Isles. *https://sites.google.com/site/BritishHetBugAtlas*.

Ryan, R. P. 2015. New county records of Hemiptera-Heteroptera from Northamptonshire. *Hemipterist* **2**: 26–27. [*https://sites.google.com/site/TheHemipterist*]

THE SOLITARY WASPS AND BEES (HYMENOPTERA: ACULEATA) OF ENGLISH COASTAL SAND DUNES

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ABSTRACT

A survey is presented of the number of aculeate solitary wasp and bee species found on 21 sand dune systems around the English coast. Analyses of these species are made using the indices of species quality, parasitic (mainly cleptoparasitic) behaviour and nesting habits. Of the 284 species recorded only 22 (7.7%) can be regarded as largely restricted to, or a large part of their distribution includes, sand dune systems. These 22 species are all, except for one species, associated with a subterranean nesting habit. English sand dune systems are an important refuge habitat (66.7% of the British list) for solitary aculeate species.

INTRODUCTION

Coastal sand dunes develop in areas where there is a sufficient supply of dry sand that can be blown and deposited above the high water mark. The sand dune often begins with a strandline by the accumulation of sand amidst a mass of wet flotsam and jetsam. Although unstable, some plants, *e.g.* Sea Rocket, become established which attract aculeates for their food resources. With more sand the dunes grow into the mobile yellow dunes enabled by the growth of Marram and Lyme grasses. Yellow dunes have areas where plants with food resources that attract aculeates, e.g. sea holly, sea spurge and sea bindweed, become established. The yellow dunes are succeeded by fixed or grey dunes which have a continuous cover of vegetation although often only with a sparse cover. A greater range of plants, e.g. Bird's Foot Trefoil, thistles and Ragwort become established. Subterranean aculeate nesters are found in the yellow and grey dunes. With increasing age of the sand dune and depending on the acidity or alkalinity of the sandy substrate, dune pasture or heath develops with the establishment of many more useful plants of benefit to aculeates, e.g. heathers, Wild Carrot, Hogweed, Wild Parsnip, clover, speedwell and Viper's Bugloss. Dune scrub with, e.g. wild rose, bramble, Gorse, Blackthorn and Sea Buckthorn may also occur often with aculeate aerial nesting sites. Between the dunes in low lying areas, called slacks, wetland vegetation such as Creeping Willow develop. Often at the back of, or even on the, sand dune systems trees and shrubs, e.g. Elder, Hawthorn, Sycamore and pine provide food resources when in flower and aerial nesting sites when dead and decaying. Herbs, shrubs and trees also provide hunting habitats for the prey of solitary wasps. Surviving decaying stone, for example, at Lindisfarne, or brick, for example, at Gibraltar Point provide further aerial nesting sites in the decaying mortar.

There are several geomorphological types of sand dunes. Bay dunes develop from a more limited supply of sand between two headlands. Spit dunes develop as sandy promontories at the mouth of estuaries, e.g. at Gibraltar Point and Sandscale Haws. Hind shore dunes develop on shallow offshore zones when there is a particularly abundant sand supply and strong offshore winds, e.g. at Ainsdale and Braunton Burrows. Offshore dunes are usually on offshore islands which are developed on ridges of coarse, free-draining deposits of sand and shingle, e.g. at Lindisfarne.

Nesses develop along an open coast when wind drives the sand up and along the coast, for example at Winterton and Saltfleetby-Theddlethorpe. Cuspate dunes are intermediate between nesses and spit dunes. Climbing dunes occur when there is higher ground inland from a dune system and sufficient wind to drive the sand up the slope (Ranwell & Boar, 1986; Radley, 1994).

The importance of sand dune systems for solitary wasps and bees has contributed in their designation as National Nature Reserves, e.g. Ainsdale, Braunton, Gibraltar Point, Holkham, Lindisfarne, Saltfleet-by-Theddlesthorpe, Walney and Winterton, or SSSI, e.g. Bamburgh, Hayle, Perranporth, Sandwich and Sandscale, status for many sites. Nevertheless losses to nature conservation interest have been caused by sand extraction, e.g. Ainsdale for glass making and Hayle, afforestation, e.g. Holkham, sheep and cattle grazing, e.g. Sandscale Haws and Ross link, part of Lindisfarne for winter holding with intensive feeding, urban development, e.g. Ainsdale, Berrow and Sandwich, golf courses, e.g. Sandwich and Penhale, and other leisure activities such as car parks with sand dune erosion by humans at Ainsdale (Ranwell & Boar, 1986; Radley, 1994).

The aim of this paper is to survey the species of solitary wasps and bees found on a number of English sand dune systems with an analysis of the numbers found including the use of species indices of quality, parasitic (mainly cleptoparasitic) behaviour and nesting habits. An attempt will be made to explain the differences found between the sand dunes.

Methods

One hundred and twenty-two day visits have been made to 21 English sand dunes systems between 1970 and 2013 with a single visit during 1961. Most visits were to sand dunes in Cumbria, Lancashire, Northumbria and Lincolnshire with fewer visits to the eastern and southern coasts. Additional species records for the 21 sand dunes systems were obtained from the NBN Gateway during 2014. Generally only the NBN Gateway records from recent times have been used. For example older records, e.g. *Mellinus crabroneus* (Thunberg) from Spurn Point and *Andrena vaga* Panzer from Sandwich, now considered extinct on sand dunes in England have not been used. Some species which probably have no recent sand dune system records, e.g. *Crossocerus walkeri* (Shuckard), *Lasioglossum pauperatum* (Brullé), *Sphecodes scabricollis* Wesmael, *Nomada argentata* Herrich-Schäffer, *N. armata* Herrich-Schäffer, have been considered. The Archer and NBN Gateway records provide good recorded lists for the 21 sand dune systems studies.

Some of the sand dune systems were a collection of adjacent sand dune systems. Ainsdale refers to the sand dunes between Southport and Formby, Hayle to the sand dunes north of Hayle including Godrevy, Upton and Gwithian dunes, Parranporth to the sand dunes north of Perranporth including Penhale and Holywell dunes and North Norfolk including Hunstanton, Holme, Holkham and Scot Head dunes.

The three species indices were derived as follows. All solitary species are given one of six statuses (Archer, 2014): the High Quality Species (Very rare, Rare, and Scarce) and Low Quality Species (Restricted, Widespread and Universal). Then a Quality Score and Species Quality Score can be calculated (Table 3). The Parasitic Load is the percentage of aculeate species that are cleptoparasites or parasitoids on nesting aculeate species. For Scotland, Wales and England the Parasitic Load is 19.6% for solitary wasps and 27.0% for solitary bees (Archer, 2014). The Aerial Nester Frequency is the percentage of aculeate nesting species that have aerial nesting sites. For some species division into subterranean and aerial nesters creates a problem, e.g.

Osmia spp., *Megachile* spp. and *Anthophora plumipes* (Pallas). For these species, with the help of Else (*in prep.*), their major nesting habit was used to define their characteristic nesting habit. For Scotland, Wales and England the Aerial Nester Frequency is 48.8% for solitary wasps and 18.2% for solitary bees (Archer, 2014).

Results

Table 1 show a list of the 21 sand dunes systems studied with their areas and are arranged according to the number of solitary species recorded. The number of recorded species from each sand dune system was very variable with a range of 113 (25–138) species representing 6–32% of the current British list (Archer, 2014). A total of 284 species, 66.7% of the British list, were recorded from the sand dune systems with slightly more species of solitary bees (52.1%) than solitary wasp (49.9%) species (Table 2).

The areas of the sand dune systems were also very variable with a range of 13–2113 ha (Table 1). The area of sand dune systems does not correlate with the number of species, e.g. compare Ainsdale and Sandy, Winterton and Dawlish, Camber and The Duver (Fig. 1; Spearman's correlation 0.372, $p = 0.029$, not significant).

No species was found on all 21 sand dune systems. The number of sand dune systems in which each species was recorded is given in Fig. 2 which shows a rapid decline from a species being found only on one sand dune system to being found on ten sand dune systems, after which the decline is much slower. This observation enables the recognition of two groups of species, those found at 1–8 and 9–20 sites, hereafter referred to as "dune-scarce" and "dune-common" species. This division will be used in further analysis. The 64 (29 wasp, 35 bee; Appendix 1) dune-common

Table 1. The areas of 21 English sand dunes systems arranged according to the number of aculeate solitary species recorded.

	Area (ha)	No. Species
Sandwich, Kent	481	138
Ainsdale, Lancashire	2113	123
Sandy, Hampshire	30	122
Braunton, North Devon	899	113
Hayle, North Cornwall	370	111
Perranporth, North Cornwall	612	106
Gibraltar Point, Lincolnshire	280	91
Berrow, Somerset	177	85
Sinah, Hampshire	63	84
Spurn Point, East Riding Yorkshire	64	75
Saltfleetby-Theddlethorpe, Lincolnshire	343	67
North Norfolk	588	67
Dawlish, South Devon	46	67
Winterton, Norfolk	302	63
The Duver, Isle of Wight	13	58
Camber, East Sussex	101	54
Sandscale Haws, Cumbria	199	49
Walney Island, Cumbria	142	41
Drigg, Cumbria	345	34
Lindisfarne, Northumbria	207	33
Bamburgh, Northumbria	92	25

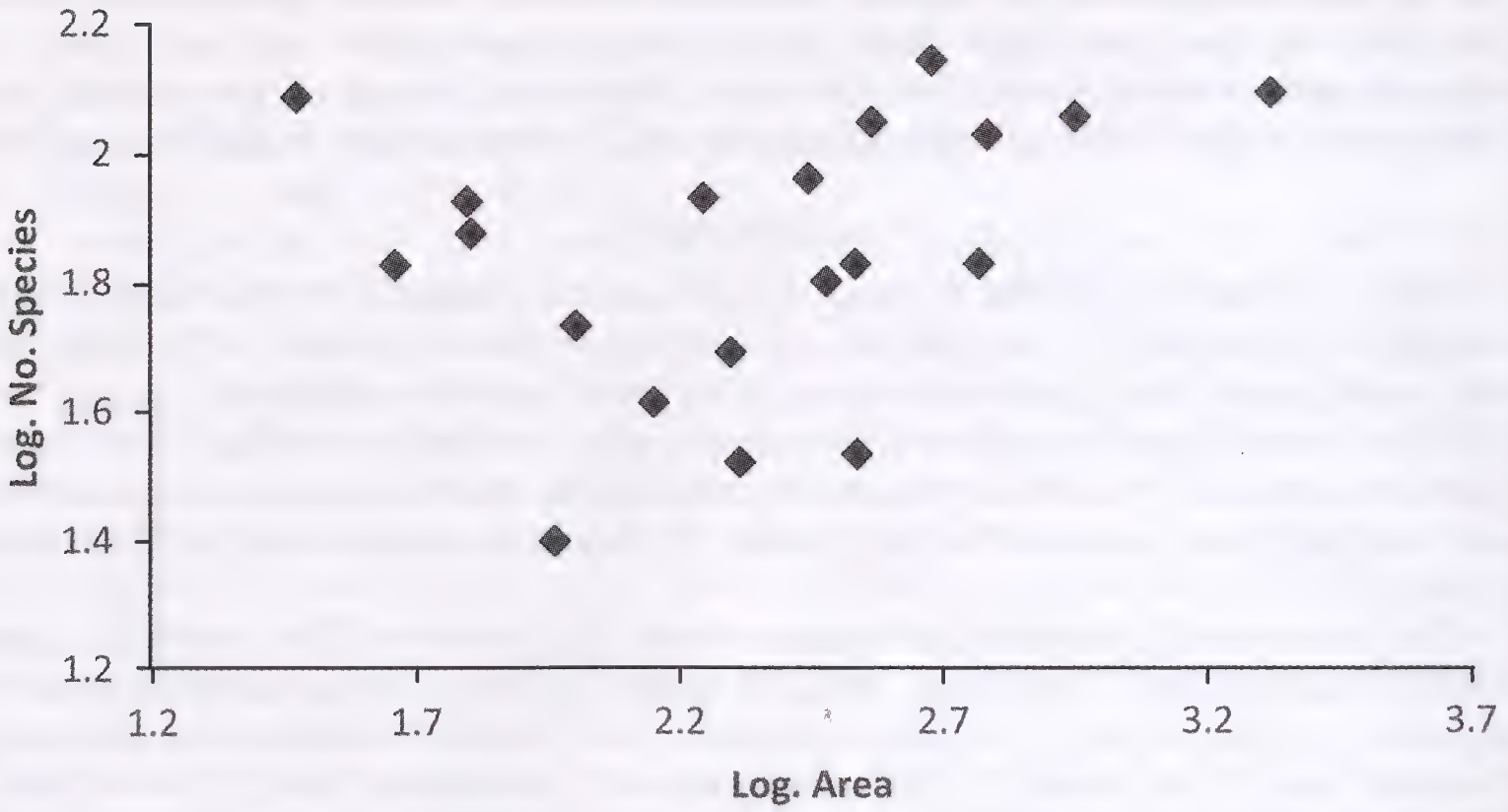

Fig. 1. The log. number of aculeate solitary species versus the log. area of 21 English sand dune systems.

species can be regarded as the species most likely to be found on most sand dune systems (Table 2).

About three-quarters of the species were dune-scarce species (77.5%) and one quarter dune-common species (22.5%). The percentage of dune-scarce wasp species (48.6%) was similar to the dune-common wasp species (45.3%) as were the dune-scarce bee (51.4%) and dune-common bee species (54.7%) (Table 2).

Table 3 shows the Quality Scores and Species Quality Scores for all dune-scarce and dune-common species. The Species Quality Score for the dune-common species

Table 2. The number of aculeate solitary wasp and bees species recorded on sand dune systems of all English and Welsh sites.

	Dune-scarce Species	Dune-common Species	Total Species (England)	Wales	England & Wales
Chrysididae	14	1	15	15	19
Tiphiidae	3	0	3	2	3
Mutillidae	3	0	3	1	3
Sapygidae	2	0	2	2	2
Pompilidae	19	6	25	24	29
Eumenidae	8	3	11	11	14
Sphecidae	1	2	3	3	3
Crabronidae	57	17	74	54	77
Solitary Wasps	**107**	**29**	**136**	**112**	**150**
Colletidae	12	6	18	12	18
Andrenidae	36	6	42	25	44
Halictidae	25	12	37	25	39
Melittidae	3	1	4	2	4
Megachilidae	15	8	23	22	25
Apidae	22	2	24	15	27
Solitary Bees	**113**	**35**	**148**	**101**	**157**
Total Solitary spp.	**220**	**64**	**284**	**213**	**307**

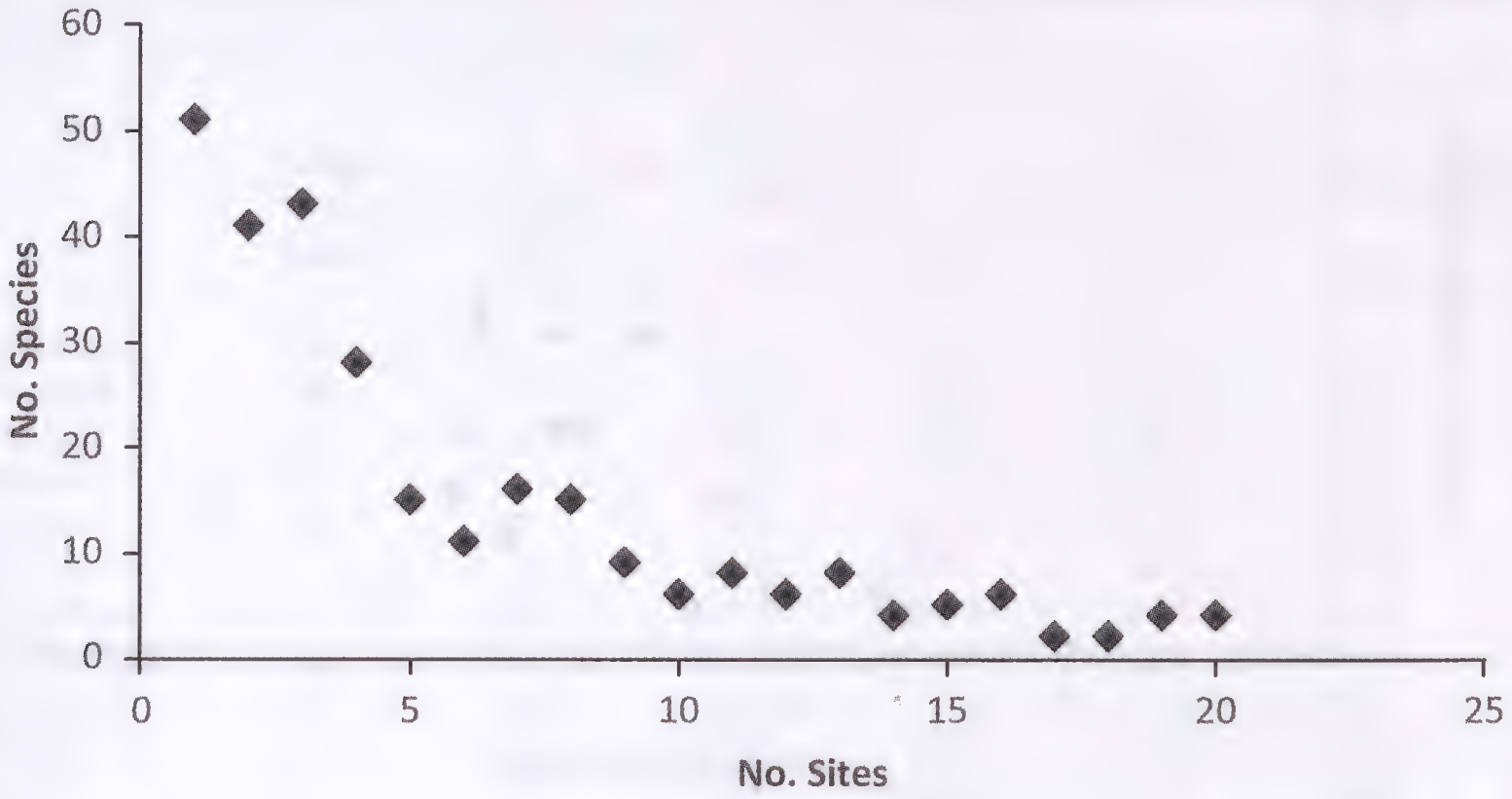

Fig. 2. The number of English sand dune systems or sites on which each aculeate solitary species was found.

is much lower than for the dune-scarce species due the complete lack of Very Rare and Rare species and with only six Scarce species. The lower Species Quality Score for all species compared with the dune-scarce species is due to the relative increase of Universal and Widespread species. The Very Rare and Rare species are usually only found in one or two, or rarely four (*Colletes cunicularius* (L.), (*Coelioxys quadridentata* (L.)), five (*Mimumesa littoralis* (Bondroit)) or seven (*Ceropales maculata* (F.), *Podalonia affinis* (Kirby)) sand dune systems (Appendix 2).

Table 4 shows the Species Quality Scores and the number of High Quality Species for each sand dune system. Generally the High Quality Species increase with the increase of the Species Quality Scores as might be expected (Fig. 3, Spearman's correlation test 0.653, $p = 0.001$). The lowest Species Quality scores are shown by the

Table 3 Archer's (2014) national quality coding for all dune-scarce and dune-common species recorded from 21 sand dune systems.

	Status Value	No. Species			Quality score		
Status	A	All species B1	Dune-scarce species B2	Dune-common species B3	All species A*B1	Dune-scarce species A*B2	Dune-common species A*B3
Universal	1	82	46	36	82	46	36
Widespread	2	101	81	20	202	162	40
Restricted	4	21	19	2	84	76	8
Scarce	8	52	46	6	416	368	48
Rare	16	18	18	0	288	288	0
Very Rare	32	10	10	0	320	320	0
Total		284	220	64	1392	1260	132

Species Quality Scores (SQS): All species 1392/284 = 4.9; dune-scarce species 1260/220 = 5.7; dune-common species 132/64 = 2.1

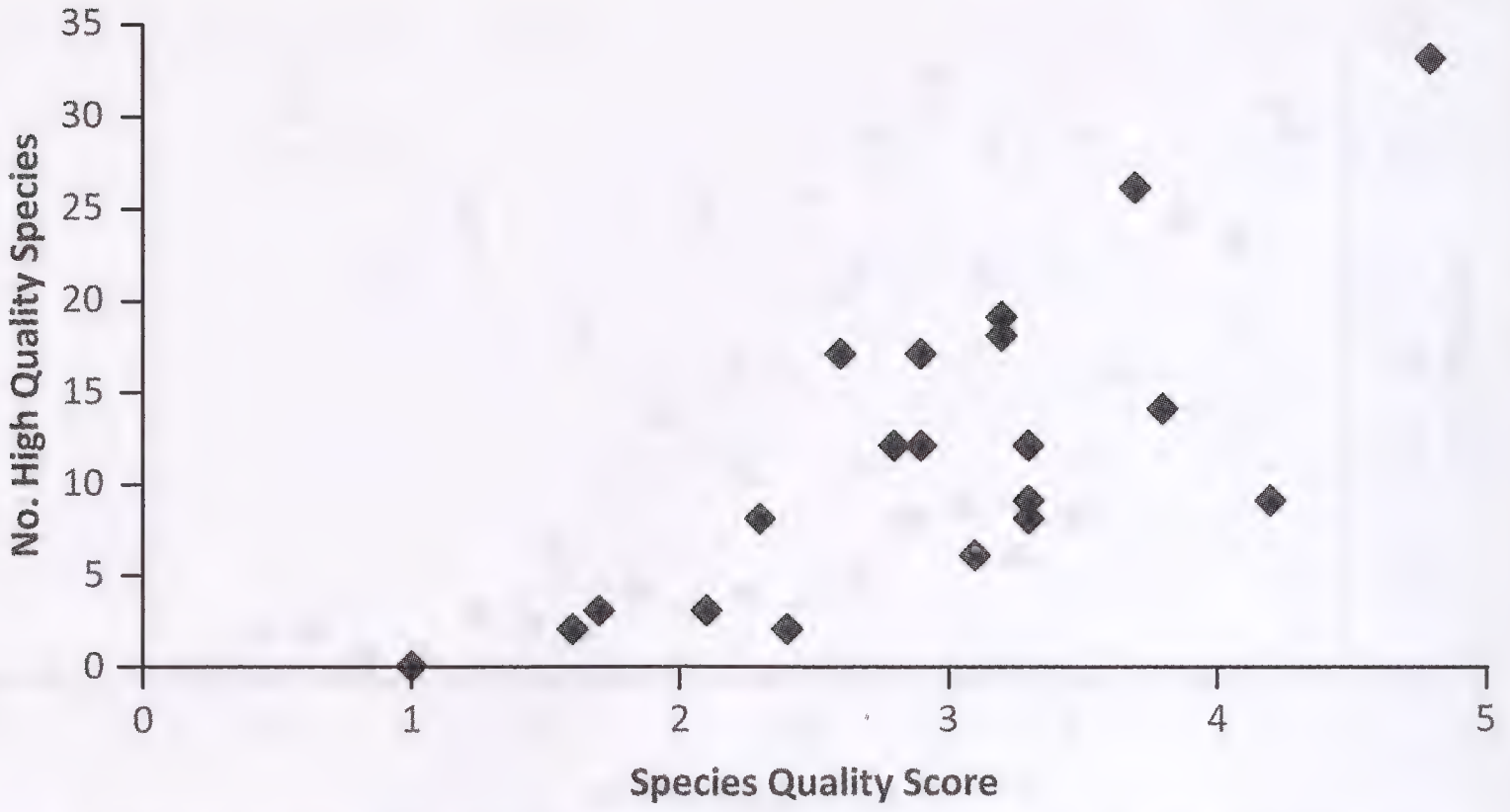

Fig. 3 The number high quality aculeate solitary species versus the Species Quality Score of 21 English sand dune systems.

five north-eastern sites. The Species Quality Scores of the north western sites, except for Drigg, are higher than the north eastern sites. The highest Species Quality Scores, except for Ainsdale and Walney, are shown by the southern and East Anglian sites.

Table 4 shows the Parasitic Load and Aerial Nester Frequency percentages of each sand dune system. Table 5 shows the Parasitic Load percentages and Table 6 the Aerial Nester Frequency percentages of all, dune-scarce and dune-common species.

From Table 5 the Parasitic Load percentages for all and dune-scarce species of both the wasps and bees are similar to the national percentages (19.6% for wasps, 27.0% for bees) and slightly lower for the dune-common bees and much lower for the dune-common wasps. From Table 4 the Parasitic Load percentages for the wasps are lower than the national percentage often being less than 17% except for Gibraltar Point which is slightly higher. The Parasitic Load percentages for the bees, compared with national percentage, are higher for seven and lower for 14 sand dune systems (five sites being lower than 20%).

From Table 6 the Aerial Nester Frequency percentages for all and dune-scarce species of both the wasps and bees are similar to the national percentages (48.8% for wasps, 18.2% for bees), lower for the dune-common wasp species and slightly higher for the dune-common bee species. From Table 4 the Aerial Nester Frequency percentages for the wasps are much lower than the national percentage except for Spurn Point which is slightly lower and Gibraltar Point which is slightly higher. The Aerial Nester Frequency percentages for the bees, compared with national percentage, are higher for 13 sites (nine sites with 25% or more) and lower for nine sites.

Appendix 2 shows lists of the High Quality (Very Rare, Rare and Scarce) species. These High Quality species have more species (81.8%) associated with the subterranean environment either as nesters or cleptoparasites than the Low Quality species (66.0%). As a consequence only 18.2% of High Quality species are associated with the aerial nesting environment which is about half that of the Low Quality species (34%).

Of the 284 species recorded from sand dune systems how many are largely restricted to, or a large part of their distribution includes, sand dune systems? The 22 such species (7.7%, Else, in press; www.bwars.com consulted 2014) can be recognised

Table 4 The Species Quality Scores, Number of High Quality Species, Parasitic Load and Aerial Nester Frequency Percentages of 21 English sand dune systems.

	Species Quality Scores	No. High Quality Species	Parasitic Load Percentages		Aerial Nester Frequencies Percentages	
			Wasps	Bees	Wasps	Bees
Sandwich	4.8	33	16.1	20.3	30.8	23.7
Sandscale	4.2	9	18.2	28.0	10.5	27.8
Dawlish	3.8	14	16.0	28.6	14.3	23.3
Ainsdale	3.7	26	15.9	19.6	37.9	29.3
Camber	3.3	8	14.3	15.2	22.2	28.6
Duver	3.3	9	14.8	16.1	30.4	15.4
Winterton	3.3	12	9.4	35.5	20.7	15.0
Perranporth	3.2	18	16.3	24.6	26.8	14.0
Braunton	3.2	19	15.0	17.6	37.3	26.2
Walney	3.1	6	19.0	25.0	17.6	33.3
Sandy	2.9	17	18.4	21.9	35.0	22.8
Berrow	2.9	12	16.1	32.1	15.4	16.7
North Norfolk	2.9	12	10.3	21.4	22.9	27.3
Sinah	2.8	12	17.6	20.0	14.3	17.5
Hayle	2.6	17	17.1	27.9	27.3	20.4
Drigg	2.4	2	15.8	13.3	25.0	15.4
Spurn Point	2.3	8	18.9	31.6	43.3	15.4
Saltfleetby	2.1	3	16.7	35.1	32.0	25.0
Gibraltar Point	1.7	3	20.0	26.1	50.0	29.4
Lindisfarne	1.6	2	16.7	20.0	33.3	16.7
Bamburgh	1.0	0	13.3	20.0	23.1	25.0

and consisting of eight Very Rare, three Rare, nine Scarce, one Restricted and one Widespread species (Table 7). These 22 species are all associated with the subterranean habitat either as nesters or cleptoparasites on nesters except for *Hylaeus annularis* (Kirby) which is an aerial nester. The few High Quality species of the dune-common sand dune systems are all Scarce species (Table 3) mainly having a coastal distribution (*Podalonia hirsuta* (Scopoli), *Coelioxys conoidea* (Illiger)) or with a major part of its distribution being coastal (*Tachysphex nitidus* (Spinola), *Oxybelus argentatus* Curtis, *Dasypoda hirtipes* (F.)). *C. conoidea* is a cleptoparasite of *Megachile maritima* (Kirby) which also has a major part of its distribution being coastal.

The habitats of the remaining 262 species are usually reported as being due to the presence of sandy, friable or lighter soils in open situations while the hosts of parasites have similar habitats. Three species are particularly associated with wetland because the prey of *Crossocerus walkeri* (Shuckard) are mayflies and the nesting site of *Hylaeus pectoralis* Förster consists of vacated galls found on the flower stem of Common Reed, while *Colletes cunicularius* (L.) collects pollen from Creeping Willow found in dune slacks.

Discussion

The lack of agreement between the area and the number of species recorded on a sand dune system is probably the consequence of many factors including

Table 5. The relative frequency of parasitic aculeate species found on 21 English sand dune systems.

	No. Parasites*, P			No. Nesters, N			% Parasitic Load, 100*P/(P+N)		
	All Species	Dune-Scarce Species	Dune-Common Species	All Species	Dune-Scarce Species	Dune-common Species	All Species	Dune-Scarce Species	Dune-common Species
Wasps	25	23	2	107	80	27	18.9	22.3	6.9
Bees	37	29	8	111	84	27	25.0	25.0	22.9

*_Cleptes nitidulus_ (F.), _Tiphia femorata_ F., _T. minuta_ Van der Linden, _Methocha articulata_ Latreille were excluded as they are parasites on non-aculeates.

Table 6. The nesting habits of all, dune-scarce and dune-common species found on 21 English sand dune systems.

	No. Aerial Nesters, A			No. Subterranean Nesters, S			% Aerial Nester Frequency = 100*A/(A+S)		
	All Species	Dune-scarce Species	Dune-common Species	All Species	Dune-scarce Species	Dune-common Species	All Species	Dune-scarce Species	Dune-common Species
Wasps	44	38	6	63	42	21	41.1	47.5	22.2
Bees	22	16	6	89	68	21	19.8	19.0	22.2

Table 7. Species with the main or major part of their distribution on English sand dune system (number of sites where recorded).

Very Rare	Scarce
Arachnospila consobrina (Dahlbom) (2)	*Smicromyrme rufipes* Thomson (5)
Evagetes pectinipes (L.) (1)	*Podalonia hirsuta* (Scopoli) (9)
Miscophus ater Lepeletier (2)	*Tachysphex nitidus* (Spinola) (13)
Mimumesa littoralis (Bondroit) (5)	*Oxybelus argentatus* Curtis (13)
Colletes floralis Eversmann (1)	*Oxybelus mandibularis* Dahlbom (6)
Colletes cunicularius (L.) (4)	*Colletes halophilus* Verhoeff (5)
Coelioxys mandibularis Nylander (1)	*Colletes marginatus* Smith (10)
Anthophora retusa (L.) (2)	*Coelioxys conoidea* (Illiger) (11)
	Dasypoda hirtipes (F.) (10)
Rare	Restricted
Arachnospila wesmaeli (Thomson) (2)	*Megachile leachella* Curtis (13)
Podalonia affinis (Kirby) (7)	Widespread
Hylaeus annularis (Kirby) (2)	*Megachile maritima* (Kirby) (13)

geographical distribution and the presence or absence of surrounding favourable habitats for aculeates.

From Tables 5 and 6 the indices of Parasitic Load and Aerial Nester Frequencies for all and dune-scarce wasp and bee species and dune-common bees are reasonably similar to the national values. The dune-common wasp species show a relative lack of parasites and aerial nesting species. The wasps still show low values of Parasitic Load and Aerial Nester Frequencies for the individual sand dunes (Table 4). The bee data (Table 4) are variable with the Parasitic Load Frequencies being particularly low for some and high for a few sand dunes and for the Aerial Nester Frequencies being high for several, particularly high for some and low for a few sand dunes. A possible explanation for these departures from the British values could relate to where the aerial nesting species are nesting; either on a sand dune system or in habitats surrounding a sand dune system. If the surrounding habitat is important for aerial nesters the sand dunes would tend to be used by the bees for food resources due to their generally larger size (Archer, 2002, 2005) and greater foraging area but not by the wasps due to their generally smaller size (Archer 2002, 2005) and smaller foraging area. Parasites tend to be found at or near the nesting sites of their hosts. Probably a more specific hypothesis for the low indices for wasps shown by Tables 5 and 6 is due to a relative lack of aerial eumenid species (Table 2) which could result in a lack of parasitic chrysidid wasps (Table 2) which are the major group of parasites of the wasps.

Sand dune systems can be regarded as very important refuge sites for solitary wasp and bee species. In a recent study of the distribution of High Quality species recorded from Priority Habitats (Archer, 2007), sand dune systems were placed fourth with 56 species after lowland heathlands (130), maritime cliffs (68) and lowland calcareous grassland (57). The current study has recorded 94 High Quality species in England and Wales updating Archer (2007) which indicates the advantage of access to the NBN Gateway records which were not available to Archer (2007).

Postscript

A study of Welsh sand dune systems (Knight, Clee & Howe, 2007) listed 213 solitary wasp and bee species with 23 species not recorded on the English's sand dune systems (Table 2). This gives a total of 307 solitary species for English and Welsh

sand dune systems (Table 2) representing 72.1% of the British list. The additional 23 species includes a further 14 High Quality species of four Very Rare (*Chrysis fulgida* L., *Symmorphus crassicornis* (Panzer), *Mimesa bicolor* (Jurine), *Stelis phaeoptera* (Kirby), two Rare (*Passaloecus monilicornis* Dahlbom, *Nomada obtusifrons* Nylander) and eight Scarce (*Cleptes semiauratus* (L.), *Chrysis viridula* L., *Pseudospinolia neglecta* (Shuckard), *Priocnemis susterai* Haupt, *Gymnomerus laevipes* (Shuckard), *Ectemnius dives* (Lepeletier & Brullé), *Lasioglossum prasinum* (Smith), *Osmia bicolor* (Schrank) species. None of these species would be characteristic of English sand dune systems although in Wales they may be because of the lack of inland sandy sites (Knight, Clee & Howe, 2007).

References

Archer, M. E. 2002. *The Wasps, Ants and Bees (Hymenoptera: Aculeata) of Watsonian Yorkshire*. Yorkshire Naturalists' Union, York.

Archer, M. E. 2005. *BWARS. Bees, Wasps and Ants Members' Handbook. Centre* for Ecology and Hydrology.

Archer, M. E. 2007. Current knowledge of British Aculeate Hymenoptera with special reference to the occurrence of High Quality species on Priority Habitats. *British Journal of Entomology and Natural History* **20**: 75–94.

Archer, M. E. 2014. Archer's status values for the solitary wasps and bees, *BWARS Newsletter*, Autumn 2014: 32–37.

Else, G. R., in prep. *Handbook of the bees of the British Isles*.

Knight, G. T., Clee, C. & Howe, M. A. 2007. *The biogeography of aculeate Hymenoptera on sand dune systems in Wales*. National Museums, Liverpool.

Radley, G. P. 1994. Sand dune vegetation survey of Great Britain. A National Inventory. Part 1: England.

Ranwell, D. S. & Boar, R. 1986. *Coast dune management guide*. Institute of Terrestrial Ecology, Abbbots Ripton.

Appendix 1 – Dune-Common Species

Chrysididae: *Hedychridium ardens* (Latreille *in* Coquebert)

Pompilidae: *Priocemis parvula* Dahlbom, *Pompilus cinereus* (F.), *Episyron rufipes* (L.), *Arachnospila anceps* (Wesmael), *Anoplius infuscatus* (Van de Linden) *Evagetes crassicornis* (Shuckard)

Eumenidae: *Ancistrocerus scoticus* (Curtis), *A. trifasciatus* (Müller), *A. gazella* (Panzer)

Sphecidae: *Ammophila sabulosa* (L.), *Podalonia hirsuta* (Scopoli)

Crabronidae: *Dryudella pinguis* (Dahlbom), *Tachysphex pompiliformis* (Panzer), *T. nitidus* (Spinola), *Trypoxylon attenuatum* Smith, *Crabro cribrarius* (L.), *C. peltarius* (Schreber), *Crossocerus elongatulus* (Van de Linden), *C. quadrimaculatus* (F.), *C. tarsatus* (Shuckard), *C. wesmaeli* (Van de Linden), *Ectemnius continuus* (F.), *Oxybelus argentatus* Curtis, *O. uniglumis* (L.), *Pemphredon lethifer* (Shuckard), *Mellinus arvensis* (L.), *Harpactus tumidus* (Panzer), *Philanthus triangulum* (F.)

Colletidae: *Colletes fodiens* (Geoffroy *in* Fourcroy), *C. maginatus* Smith, *C. similis* Schenck, *Hylaeus brevicornis* Nylander, *H. communis* Nylander, *H. hyalinatus* Smith

Andrenidae: *Andrena barbilabris* (Kirby), *A. carantonica* Pérez, *A. dorsata* (Kirby), *A. flavipes* Panzer, *A, haemorrhoa* (F.), *A. nigroaenea* (Kirby)

Halictidae: *Halictus rubicundus* (Christ), *H. tumulorum* (L.), *Lasioglossum albipes* (F.), *L. calceatum* (Scopoli), *L. leucopus* (Kirby), *L. leucozonium* (Kirby), *L. punctatissimum* (Schenck), *L. villosulum* (Kirby), *Sphecodes ephippius* (L.), *S. geoffrellus* (Kirby), *S. monilicornis* (Kirby), *S. puncticeps* Thomson

Melittidae: *Dasypoda hirtipes* (F.)

Megachilidae: *Osmia aurulenta* (Panzer), *Megachile centuncularis* (L.), *M. circumcincta* (Kirby), *M. leachella* Curtis, *M. maritima* (Kirby), *M. willughbiella* (Kirby), *Coelioxys conoidea* (Illiger), *C. elongata* Lepeletier
Apidae: *Epeolus cruciger* (Panzer), *E. variegatus* (L.)

Appendix 2 – Very Rare, Rare & Scarce Aculeate Solitary Species

(Number of English sand dune systems where recorded)

Very Rare Species

Arachnospila consobrina (Dahlbom) (2), *Evagetes pectinipes* (L.) (1),
Miscophus ater Lepeletier (2), *Mimumesa littoralis* (Bondroit) (5),
Colletes cunicularius (L.) (4), *C. floralis* Eversmann (1),
Coelioxys mandibularis Nylander (1), *C. quadridentata* (L.) (4),
Nomada armata Herrich-Schäffer (1), *Anthophora retusa* (L.) (2).

Rare Species

Cryptocheilus notatus (Rossi) (2), *Priocnemis coriacea* Dahlbom (1),
Arachnospila wesmaeli (Thomson) (2),
Odynerus melanocephalus (Gmelin *in* L.) (2), *Ceropales maculata* (F.) (7),
Podalonia affinis (Kirby) (7), Crossocerus *walkeri* (Shuckard) (1),
Mimumesa unicolor (Van de Linden) (1), *Mimesa bruxellensis* Bondroit (2),
Argogorytes fargeii (Shuckard) (1), *Hylaeus annularis* (Kirby) (2),
H. pectoralis Förster (1), *Andrena simillima* Smith (2),
Halictus confusus Smith (1), *Lasioglossum pauperatum* Brullé (1),
Sphecodes scabricollis Wesmael (1), *Stelis ornatula* (Klug) (2),
Nomada argentata Herrich-Schäffer (1).

Scarce Species

Cleptes nitidulus F.) (2), *Pseudomalus violaceus* (Scopoli) (1), *Hedychridium cupreum* (Dahlbom) (6), *H. roseum* (Rossi) (2), *Hedychrum niemelai* Linsenmaier (1), *Chrysis illigeri* (Wesmael) (1), *C. ruddii* Shuckard (3),
Tiphia femorata F. (3), *Methocha articulata* Latreille (2),
Mutilla europaea L. (1), *Smicromyrme rufipes* (F.) (5),
Monosapyga clavicornis (L.) (1),
Priocnemis gracilis Haupt (1), *P. hyalinata* (F.) (2), *Auplopus carbonarius* (Scopoli) (1), *Anoplius concinnus* (Dahlbom) (4), *A. viaticus* (L.) (4), *Arachnospila minutula* (Dahlbom) (3),
Microdynerus exilis (Herrich-Schäffer) (3),
Podalonia hirsuta (Scopoli) (9),
Tachysphex nitidus (Spinola) (13), *Miscophus concolor*, Dahlbom (1), *Oxybelus argentatus* Curtis (13), *O. mandibularis* Dahlbom (6), *Pemphredon morio* Van de Linden (1), *Diodontus insidiosus* Spooner (1), *D. tristis* (Van de Linden) (3), *Nysson dimidiatus* Jurine (6), *Didineis lunicornis* (F.) (1), *Lestiphorus bicinctus* (Rossi) (4), *Cerceris ruficornis* (F.) (2),
Colletes halophilus Verhoeff (5), *C. marginatus* Smith (10), *Hylaeus pictipes* Nylander (2),
Andrena alfkenella Perkins (3), *A. hattorfiana* (F.) (2), *A. marginata* F. (2), *A. nigriceps* (Kirby) (3), *A. nitidiuscula* Schenck (1), *A. pilipes* F. (5), *A. proxima* (Kirby) (1),
Lasioglossum brevicorne (Schenck) (3), *L. quadrinotatum* (Kirby) (2), *L. xanthopus* (Kirby) (1), *Sphecodes ferruginatus* von Hagens (1),
Melitta haemorrhoidalis (F.) (3), *M. tricincta* Kirby (2), *Dasypoda hirtipes* (F.) (10),
Stelis punctulatissima (Kirby) (3), *Coelioxys concoidea* (Illiger) (11),
Nomada integra Brullé (3), *Anthophora quadrimaculata* (Panzer) (3).

FIELD MEETINGS

Moor Green Lakes, Berkshire, 13 June 2015

Leader: **Ian Sims** – This was a joint field meeting held between the British Entomological and Natural History Society, Berkshire Moth Group and Moor Green Lakes Group. Attendance was low, (leader plus Jon Cole and Paul Black) although the weather was perfect (cloudy, warm and calm all night). Between us we ran four 120w mercury vapour light traps from 22.00h on the 13th to 05.00h on the 14th, two on the north bank and two on the west bank of Colebrook Lake North (Fig. 1).

During a survey conducted here in 2011 by Jon Cole and the leader a strong population of the Small Elephant Hawk-moth *Deilephila porcellus* (L.) was identified. The dual aim of this field meeting was to assess the continuing state of the *D. porcellus* population, and to record other species of nocturnal Lepidoptera.

A total of 105 species of Lepidoptera (84 macros and 21 micros) was recorded, including a freshly emerged example of the Marbled White *Melanargia galathea* (L.) seen by torch light roosting on a grass blade.

I am pleased to report that the population of *D. porcellus* is still doing very well, with over 20 freshly emerged (pristine) individuals being seen during the meeting. Most came to the lights between 22.00h and midnight, with a second smaller flight before dawn (around 03.00h). Three other species of hawk-moth were recorded: singletons of the Elephant *D. elpenor* (L.) and Eyed *Smerinthus ocellata* (L.), and two specimens of Poplar Hawk-moth *Laothoe populi* (L.). Other interesting records included the Poplar Lutestring *Tethea or* (D. & S.), Grass Rivulet *Perizoma albulata* (D. & S.), Least Black Arches *Nola confusalis* (Herr.-Schaff.) and Bird's Wing *Dipterygia scabriuscula* (L.).

Fig. 1. Paul Black's light traps on the western bank of Colebrook Lake North. Photo: Jon Cole.

FIRST INCURSION OF TASMANIAN EUCALYPTUS BEETLE *PAROPSISTERNA SELMANI* IN BRITAIN, WITH A REVIEW OF *PAROPSISTERNA* SPECIES RECORDED IN BRITAIN (COLEOPTERA: CHRYSOMELIDAE)

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ABSTRACT

In June 2015, a large infestation of Tasmanian eucalyptus beetle *Paropsisterna selmani* Reid & de Little (Coleoptera: Chrysomelidae) larvae was found causing severe defoliation to a number of specimens of *Eucalyptus globulus, E. gunnii, E. urnigera, E. gunnii* × *E. urnigera*, and to a lesser degree *E. pauciflora* plants grown outdoors at the Royal Botanic Gardens, Kew, Richmond, Surrey. This is the first incursion of this Australian beetle in Britain. It has already been established in the Republic of Ireland since 2007, and a single adult beetle was photographed in London in 2012. The Urn-fruited Gum (*E. urnigera*) and its hybrid *E. gunnii* × *E. urnigera* are here recorded as new hosts for *P. selmani*. The biology, geographical distribution and economic importance of *P. selmani* are discussed. In addition, the status of three other *Paropsisterna* species that have been intercepted in England is reviewed. The latter three species were all found as 'hitch hikers' on Australian tree ferns (*Dicksonia antarctica*) imported from Australia and New Zealand.

INTRODUCTION

In 2007 an exotic leaf beetle was found damaging cultivated *Eucalyptus* species in County Kerry, Republic of Ireland. Specimens were sent to The Food and Environment Research Agency (UK), the Australian Museum, and the Tasmanian Museum and Art Gallery, Australia. The same beetle had been previously found damaging *Eucalyptus* plantations in Tasmania, Australia, and on the 17 August 2012 a single adult was photographed in a garden in London (on a roof garden, Kensal Green, Middlesex) (https://www.flickr.com/photos/frenchp/7806814594/). In all three cases, the beetle was tentatively identified as the Eucalypt beetle *Paropsisterna gloriosa* (Blackburn) (Coleoptera: Chrysomelidae) but it was subsequently described in 2013 as a new species, *P. selmani* Reid & de Little (Reid & de Little, 2013).

On the 17 June 2015, the second author found beetle larvae causing severe defoliation to several specimens of Tasmanian Blue Gum *E. globulus* Labill., Cider Gum *E. gunnii* Hook. f., Urn-fruited Gum *E. urnigera* J. D. Hook, *E. gunnii* × *urnigera* and to a lesser degree Snow Gum *E. pauciflora* Sieber ex Spreng., plants grown outdoors at the Royal Botanic Gardens, Kew, Richmond, Surrey. The finding was reported to The Animal and Plant Health Agency (APHA) and images supplied to Fera. Samples were collected by Mike Robinson of the Plant Health and Seeds Inspectorate (PHSI) APHA, and sent to Fera for diagnosis. The beetle larvae were reared in Petri-dishes in an incubator (23°C) in a plant health quarantine-licensed laboratory. Pupae were first observed on the 21 June, and adults first emerged on the 3 July, which were identified as *P. selmani* by the first author. This is the first time that a population of this species has

been found in Britain although its introduction had been anticipated since it became established in Ireland.

Many of the eucalyptus leaves were also heavily infested by the invasive Australian gall-inducing species *Ophelimus maskelli* (Ashmead) (Hymenoptera: Eulophidae) which has established in S. E. England since it was first found breeding outdoors in private gardens in London in 2005 (Tilbury & Jukes, 2006).

The purpose of this communication is to report the first known incursion (an isolated population of a pest recently detected in an area, not known to be established, but expected to survive for the immediate future (FAO, 2015)) of *P. selmani* in Britain, to assess its potential impact, and to review records of all *Paropsisterna* species that have been found in Britain. Adult specimens are deposited at Fera.

Detection and identification

The adults (Plate 13, Figs 1–2) and larva (Plate 13, Fig. 3) of *P. selmani* are relatively easy to detect as they cause conspicuous defoliation (Plate 13, Fig. 4) and can severely damage new growth. The adult beetles are brightly coloured.

The larvae (Plate 13, Fig. 3) are pale yellowish-green with two pairs of lateral, longitudinal rows of dark brown markings; the final instar larva is up to 12.5 mm long. Adult *P. selmani* are oval (Fig. 1), hemispherical (Fig. 2), and about 9 mm in length with the females being slightly larger than the males. In life, they may be recognised by the following suite of morphological characters: elytra (wing cases) with a distinct bright yellow (or metallic gold) marginal line (Plate 13, Figs 1 and 2), and a dorsal diamond outline shape in the apical half of the combined elytra (Plate 13, Fig. 1). The colour of the elytra is variable from blackish, speckled with red or cream, or almost translucent to tan with deep red markings at the base of the elytra. The males tend to be darker and redder than the females, and all the beetles are darker in the spring, after emerging from hibernation. These are chemical colours, not physical, and dead dried specimens become a uniform brown and are much more difficult to identify. The colours may be retained in specimens preserved in 70% ethyl alcohol. A detailed morphological description is provided by Reid & de Little (2013). A key identifying the genus *Paropsisterna* in Australia, with a generic description and full generic synonymy are provided by Reid (2006). Pictures of many *Paropsisterna* species are available on the website 'Insects of Tasmania' (https://sites.google.com/site/insectsoftaschrysomeloidea/suborder-polyphaga/chrysomelidae-leaf-beetles/subfamily-chrysomelinae/genus-paropsisterna).

Host range and biology

Paropsisterna selmani feeds exclusively on *Eucalyptus* species (Myrtaceae), preferentially on glaucous-foliaged eucalypt species of the subgenus *Symphyomyrtus*, particularly the plantation tree Shining Gum *E. nitens* (Maiden). Other hosts include: Brooker's Gum *E. brookeriana* A. M. Gray; Mountain Gum *E. dalrympleana* Maiden; Tingiringi Gum *E. glaucescens* Maiden & Blakely; *E. globulus*; *E. gunnii*; *E. gunnii* × *urnigera*; Tasmanian Yellow Gum *E. johnstonii* Maiden; Narrow-leaved Sally *E. moorei* Maiden & Cambage; Narrow-leaved Black Peppermint *E. nicholii* Maiden & Blakely; Small-leaved Gum *E. parvula* L. A. S. Johnson & K. D. Hill; Alpine Snow Gum *E. pauciflora* ssp. *niphophila* (Maiden & Blakely) L. Johnson & Blakely; Spinning Gum *E. perriniana* Herb. Perrin ex Maiden; Silver-leaved Mountain Gum *E. pulverulenta* Sims; Candlebark Gum *E. rubida* H. Deane &

Maiden; *E. urnigera*; Varnished Gum *E. vernicosa* Hook. f.; and Manna Gum *E. viminalis* Hook. Most of these *Eucalyptus* species can be grown outdoors in Britain.

The biology of *P. selmani* has been studied in detail, both in the field and under laboratory conditions in Ireland, by Fanning & Baars (2014). Adult beetles and larvae both feed on the foliage and cause typical broom-top apical damage to trees. The larvae generally feed singly although at high density several larvae may be found feeding together on each leaf. Adult beetles over-winter in the soil, emerge in April, mate and lay egg batches each containing approximately seven eggs on the leaves. There are four larval instars and teneral (young) adults are most noticeable in late June and July. The life cycle took approximately 26 days to complete at 20°C, and survival rates were approximately 67% when fed on *E. parvula*. Teneral adults took 13.3 days to initiate egg-laying. Leaf consumption was highest in female larvae, and adult beetles consumed a leaf area of approximately 100 mm per day. A mean daily egg-laying rate of 11.4 eggs per female was recorded over a period of 130 days. This high fecundity (mean of 1480 eggs per female at 20°C) is comparable to other leaf beetles attaining pest status in *Eucalyptus*-growing regions.

The adult beetles are winged and capable of natural dispersal to eucalypts within its flight range. All stages may be accidentally transported over long distances with international trade in eucalypt plants and foliage. The adults may also be carried as stowaways with non-eucalypt material, for example live *Paropsisterna* beetles have been intercepted in the UK by the PHSI on several occasions with Australian tree ferns *Dicksonia antarctica* Labill. imported from Australia and New Zealand (details provided below).

Geographical distribution

Paropsisterna selmani is suspected to be native to Tasmania, Australia, and has been introduced to the Republic of Ireland (Reid & de Little, 2013) where it occurs widely in the south (Counties Cork and Wexford). The first known incursion in Britain is reported here.

Economic importance

Paropsisterna selmani is a significant pest of *Eucalyptus* plantations in both Australia and the Republic of Ireland (Reid & de Little, 2013). This is because the beetle appears capable of rapidly achieving epidemic proportions in large monospecific plantations. Adults and larvae cause similar damage and are capable of causing considerable defoliation (40%), completely stripping the leaves from branches, disbudding shoots, affecting plant architecture, resulting in economic losses. *Eucalyptus* species, native to the Australian biogeographic region, are planted world-wide as a fast-growing source of timber, pulpwood and other products. Therefore, *P. selmani* has the potential to have an economic impact in many parts of the world where suitable eucalypt hosts are grown and the climate is suitable.

Cool temperate species of eucalypts are widely grown in the UK as ornamental plants. They are also cultivated as a source of foliage for the floristry industry and there has been a resurgence of the eucalypt industry in the UK for utilising the woody biomass, grown under short rotation forestry management systems, to produce electricity or heat (Leslie, Mencuccini & Perks, 2012).

Paropsisterna species recorded in Britain

Four exotic species of *Paropsisterna*, all eucalypt feeders, have been recorded in Britain but only one, *P. selmani*, has been found breeding in the country. The majority of the samples recorded here were collected by the PHSI during inspections of imported plant material for regulated pests. The beetles were identified by specialists in Australia (details provided under acknowledgments).

Paropsisterna bimaculata (Olivier)

This species is endemic to Tasmania where it is a major economic pest of eucalyptus plantations. It has been intercepted in the UK on five occasions.

Collection data. England: West Sussex, at two separate commercial nurseries, on *D. antarctica*, imported from Australia, vi.2004, leg. A. Gaunt (PHSI), xi.2004 (twice), xii.2004 and vii.2006, leg. Dan Munro (PHSI).

Paropsisterna m-fuscum (Boheman)

Native to Australia, this species is a pest of eucalypts. It has been intercepted in the UK on one occasion.

Collection data. England: West Sussex, commercial nursery, on *D. antarctica* imported from Australia, vi.2004, leg. A. Gaunt.

Paropsisterna ? lignea (Erichson)

An Australian species that has been intercepted in the UK on two occasions, including on a plant imported from New Zealand, although it does not appear to have been recorded from that country.

Collection data. England: West Sussex, commercial nursery, on *D. antarctica* imported from New Zealand, vi.2004, leg. A. Gaunt; Hampshire, Southampton Port, v.2008, on *D. antarctica* from Australia, leg. PHSI.

Paropsisterna selmani Reid & de Little

The first incursion is reported here. This species has not been intercepted on imported plant material.

Paropsisterna sp.

Intercepted in the UK on one occasion. The adult was in poor condition and could not be identified to species.

Collection data. England: West Sussex, commercial nursery, on *D. antarctica* imported from Australia, vi.2004, leg. A. Gaunt.

Discussion

Paropsisterna selmani is an invasive species in Ireland where it severely defoliates the new flush foliage of several *Eucalyptus* species. It poses a potential threat to ornamental eucalypts in the UK, and ornamental and forestry eucalypts in mainland Europe.

Paropsisterna selmani is just one of several exotic eucalypt-feeding insects that have been introduced to Europe including: blue gum psyllids, *Ctenarytaina eucalypti* (Maskell), *C. peregrina* Hodkinson and C. *spatulata* Taylor (Hemiptera: Aphalaridae) (Laing, 1922; Costanzi, Malausa & Cocquempot, 2003; Hodkinson, 2007); Red Gum Lerp Psyllid, *Glycaspis brimblecombei* Moore (Hemiptera: Psyllidae) (Valente & Hodkinson, 2009); Eucalyptus Snout Beetle, *Gonipterus scutellatus* Gyllenhal (Coleoptera: Curculionidae) (Arzone & Meotto, 1978); *Leprosa milga* Kim & La Salle (Hymenoptera: Eulophidae) (Kim & La Salle, 2008); Blue Gum Chalcid, *Leptocybe invasa* Fisher & La Salle (Hymenoptera: Eulophidae) (Mendel *et al.*, 2004); *Ophelimus maskelli* (Ashmead) (Hymenoptera: Eulophidae) (Arzone & Alma, 2000, misidentified as *O. eucalypti* (Gahan)); Eucalyptus Long Horned Borer, *Phoracantha semipunctata* F. (Coleoptera: Cerambycidae) (Way, Cammell & Paiva, 1992); *Quadrastichodella nova* Girault (Hymenoptera: Eulophidae) (Kim & La Salle, 2008); and Bronze Bug, *Thaumastocoris peregrinus* Carpintero & Dellapé (Hemiptera: Thaumastocoridae) (Laudonia & Sasso, 2012). Only three of these species, *C. eucalypti*, *C. peregrina* and *O. maskelli*, have so far become established in Britain.

Any findings of suspected non-native pests on eucalypts or other plants should be reported to the local APHA PHSI office or to the PHSI HQ, York (Tel.: 01904 465625).

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The authors would like to thank Dr David de Little (Tasmanian Museum and Art gallery, Australia) and Dr Chris Reid (Department of Entomology, Australian Museum) for identifying *Paropsisterna* specimens; Dr Jan-Robert Baars (University College Dublin) for providing useful comments on the manuscript; Joe Ostoja-Starzewski (Fera) for originally dealing with the beetle samples from Ireland; Sharon Reid (Fera) for arranging pictures of the beetles to be sent to the appropriate specialists; and Mike Robinson (PHSI) for sending specimens to Fera. Larvae were reared in the Fera laboratory under the authority of Plant Health Licence No. 33173/220099-3b.

References

Arzone, A. & Alma, A. 2000. Eulofide galligeno dell'Eucalipto in Italia. *Informatore Fitopatologico* **12**: 43–46.

Arzone, A. & Meotto, F. 1978. Biological findings on *Gonipterus scutellatus* Gyll. (Col. Curculionidae) infesting eucalyptus trees on the Ligurian Riviera. *Redia* **41**: 205–222.

Costanzi, M., Malausa, J.-C. & Cocquempot, C. 2003. Un nouveau psylle sur les *Eucalyptus* de la Riviera Ligure et de la Côte d'Azur. Premières observations de *Ctenarytaina spatulata* Taylor dans le Bassin méditerraneéen occidental. *Phytoma, la défense des végétaux* **556**: 48–51.

Fanning, P. D. & Baars, J.-R. 2014. Biology of the *Eucalyptus* leaf beetle *Paropsisterna selmani* (Chrysomelidae: Paropsini): a new pest of *Eucalyptus* species (Myrtaceae) in Ireland. *Agricultural and Forest Entomology* **16**: 45–53.

FAO, 2015. Glossary of Phytosanitary Terms. *International Standards for Phytosanitary Measures* (ISPM) **5**: 1–34.

Hodkinson, I. D. 2007. A new introduced species of *Ctenarytaina* (Hemiptera, Psylloidea) damaging cultivated *Eucalyptus parvula* (= *parvifolia*) in Europe. *Deutsche Entomologische Zeitschrift* **54**: 27–33.

Kim, I.-K. & La Salle, J. 2008. A new genus and species of Tetrastichinae (Hymenoptera: Eulophidae) inducing galls in seed capsule of *Eucalyptus*. *Zootaxa* **1745**: 63–68.

Laing F, 1922. *Rhinocola eucalypti* Mask. in England. *Entomologist's Monthly Magazine* **58**: 141.

Laudonia, S. & Sasso, R. 2012. The bronze bug *Thaumastocoris peregrinus*: a new insect recorded in Italy, damaging to Eucalyptus trees. *Bulletin of Insectology* **65**: 89–93.

Leslie, A. D., Mencuccini, M. & Perks, M. 2012. The potential for *Eucalyptus* as a wood fuel in the UK. *Applied Energy* **89**: 176–182.

Mendel, Z., Protasov, A., Fisher, N. & La Salle, J. 2004. Taxonomy and biology of *Leptocybe invasa* gen. & sp. n. (Hymenoptera: Eulophidae), an invasive gall inducer on *Eucalyptus*. *Australian Journal of Entomology* **43**: 101–113.

Reid, C. A. & de Little, D. W. 2013. A new species of *Paropsisterna* Motschulsky, 1860, a significant pest of plantation eucalypts in Tasmania and Ireland (Coleoptera: Chrysomelidae: Chrysomelinae). *Zootaxa* **4**: 395–404.

Reid, C. A. M. 2006. A taxonomic revision of the Australian Chrysomelinae, with a key to the genera (Coleoptera: Chrysomelidae). *Zootaxa* **1292**: 1–119.

Tilbury, C. & Jukes, M. 2006. *Ophelimus ?maskelli*: A new gall-causing eulophid wasp (Hymenoptera: Chalcidoidea) on *Eucalyptus* in London. *Cecidology* **21**: 90–91.

Valente, C. & Hodkinson, I. 2009. First record of the redgum lerp psyllid, *Glycaspis brimblecombei* Moore (Hem.: Psyllidae), in Europe. *Journal of Applied Entomology* **133:** 315–317.

Way, M. J., Cammell, M. E. & Paiva, M. R. 1992. Studies on egg predation by ants (Hymenoptera: Formicidae) especially on the eucalyptus borer *Phoracantha semipunctata* (Coleoptera: Cerambycidae) in Portugal. *Bulletin of Entomological Research* **82**: 425–432.

SHORT COMMUNICATION

The Ring-tipped Grassbug, *Notostira erratica* (L.) (Hemiptera: Miridae), in Warwickshire, Northamptonshire and Gloucestershire. – Until recently, this species was supposed not to occur in Britain. It occurs in Ireland, but its British status was dependent upon just two female specimens in the British Museum (Natural History), taken from Mildenhall, North Wiltshire (VC7) (Woodroffe, 1977). Given that only the males of the species are regarded as being reliably separable from the very similar and common *Notostira elongata* (Geoffroy), requiring examination of the genitalia, and given the absence of other British records (Ryan, 2014a & 2014b), there had been some doubt over the status of *N. erratica* on the British list.

This situation changed in 2013, when a single male of the species was taken in Oxfordshire (VC23) (Nelson, 2014); followed, in 2014, with another 71 male examples taken across Oxfordshire, Berkshire (VC22) and Buckinghamshire (VC24) (Ryan, 2015). The 2014 study involved the examination of 810 male *Notostira* Fieber, *N. erratica* typically comprising about 4% of the population, although at one site (the margins of a bridleway) it was 90%. In 2015, I continued my study of the distribution of this animal, the details of which are given below.

The year did not start well. I discovered a large meadow (ideal grassbug habitat) by a lake at Baulking, near Stanton in the Vale, Watsonian Berkshire (SU325907) on 19 June, and took 51 male *Notostira*, followed by another 340 four days later. All proved to be *N. elongata*. A third visit on 7 September gathered 302 more male *Notostira*, but again not a single *N. erratica* was found among them. Elsewhere during the year I had taken 27 male *Notostira* from various sites, only one of which proved to be *N. erratica*. However, returning to the region of this solitary capture, on 10 September, my fortune changed. I took 60 examples of male *Notostira* from a road verge, near Newton Purcell, Oxfordshire (SP630312), 12 of which were *N. erratica*.

Pooling my experiences from this year and last, I came to the view that *N. erratica* was possibly not a species best found in open grassy areas, and is perhaps better

sought in narrow grassy margins. Armed with this hypothesis, I attempted to find more *N. erratica* during my next entomological excursion. On 13 September I sampled four road verges in the vicinity of Chearsley and Winchendon, Buckinghamshire (SP720108, SP726112, SP722124 & SP737134). Each delivered both species of *Notostira*, providing a total of 112 males, 35 of which were *N. erratica*. So, my score for the year so far had risen from one to 48 *N. erratica*, by adopting the strategy of targeting grassy margins.

I now had a method with which I could tackle other vice-counties, with a reasonable chance of success, and on 15 September I visited the area around Whichford and Brailes Hill, Warwickshire (VC38). Before heavy rain ended the day's entertainment, I had sampled six sites, three of which produced *Notostira*. Only one of these, the margin of a ploughed field (SP295403), delivered *N. erratica*. Out of a total of just ten males taken in the day, three were *N. erratica*. I had better luck avoiding bad weather on the following day, in the region of Brackley, Northamptonshire (VC32). I had previously tried to record the animal here from a meadow at Helmdon (SP581439), but a total of 30 male *Notostira*, taken this year and last, had not included any *N. erratica*. Now, by sampling a dozen road verges, bridleways and field margins, I found six sites for *Notostira*, four of which supported *N. erratica* (SP573353, SP531375, SP544437 & SP621410). Of 54 males taken, 13 were *N. erratica*. My final foray of the year was in the region of Fairford, East Gloucestershire (VC33). Four roadside verges here all provided *Notostira*. Two of them included male *N. erratica* (SP211034 & SP183025), providing five examples among a total catch of 30 *Notostira*.

This recent work brought my total haul for the year to a respectable 69 *N. erratica*, two short of my total for 2014. The totals for grassy margins in September are 68 (26%) *N. erratica* among 266 *Notostira*, in contrast to the dismal one among 720 from sampling earlier in the year.

I have now added all five of the vice-counties adjacent to my home vice-county of Oxfordshire to the known distribution of *N. erratica*. The relative ease with which this was done, in particular using the strategy of grassy margins in September, suggests that other workers elsewhere could enjoy similar success. It will be interesting to see how far the range of this species' distribution extends across Britain, once records from other parts of the country are published.

Notostira erratica does not have an English name, and given that the males are easily identified from the protruding ring formed by the left paramere, reminiscent of the ring-pull on a Mills bomb, I have chosen to refer to the species as the Ring-tipped Grassbug. – R. P. RYAN, 38 St John Street, Oxford OX1 2LH (email: *RobRyanBugs@gmail.com*).

REFERENCES

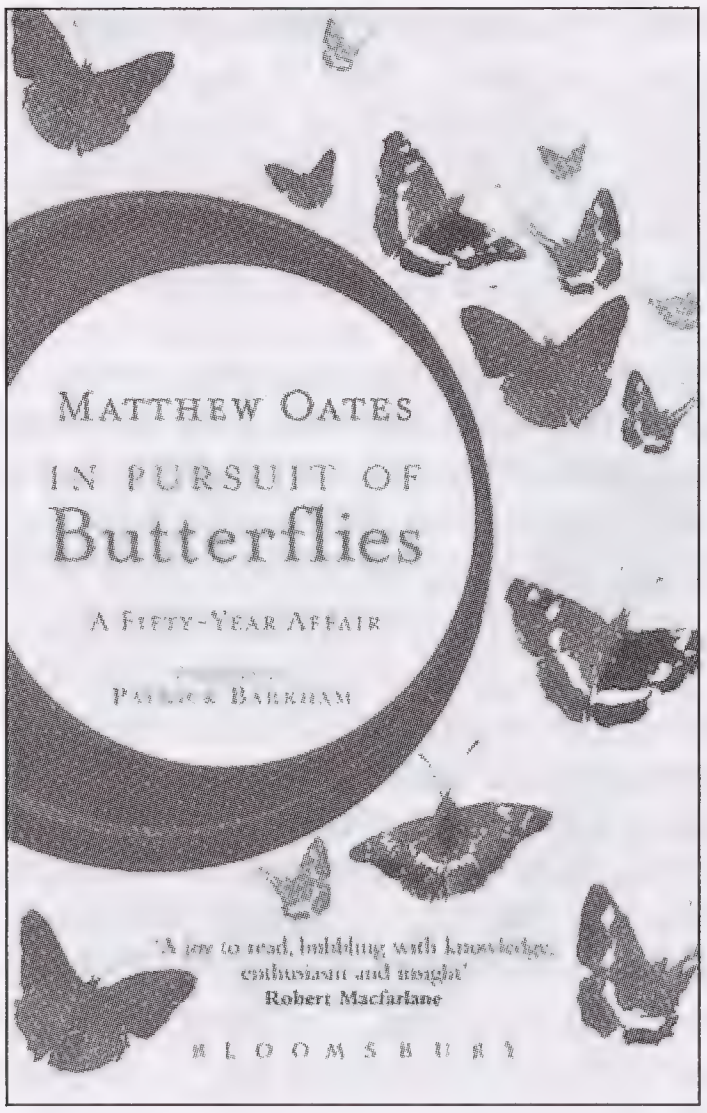
Nelson, B. 2014. Confirmation of *Notostira erratica* (Heteroptera: Miridae) as a British species with comments on its identification. *British Journal of Entomology and Natural History* **27**: 151–154.

Ryan, R. P. 2014a. The county distribution of the Hemiptera-Heteroptera of the British Isles, fourth edition. *Hemipterist* **1**: 38-103. [*https://sites.google.com/site/TheHemipterist*]

Ryan, R. P. 2014b. An Atlas of the Hemiptera-Heteroptera of the British Isles. *https://sites.google.com/site/BritishHetBugAtlas*.

Ryan, R. P. 2015. Further records of *Notostira erratica* (Linnaeus) (Hemiptera: Miridae) from Oxfordshire, and the insect new to Berkshire and Buckinghamshire. *Entomologist's Monthly Magazine* **151**: 125–126.

Woodroffe, G. E. 1977. *Notostira erratica* (L.) and *N. elongata* (Geoffroy) (Hem., Miridae) in the British Isles. *Entomologist's Gazette* **28**: 123–126.



BOOK REVIEW

In Pursuit of Butterflies: A Fifty-Year Affair by Matthew Oates. Bloomsbury Publishing, London, 2015. Hardback in dust jacket, 480pp, £18.99. ISBN 978-4729-2450-6.

This review didn't start well: the publishers, Bloomsbury, were reluctant to provide the Society with a review copy and their communication was poor. The book is a typical modern hardback in jacket, economically produced and runs to a substantial 480 pages. There is a centre section of colour photographs, mainly to visualise the key species mentioned and their major aberrations (which feature strongly in his "affair") plus one or two portraits (including one of the author) and there are some very nice vignettes by Tim Bernhard amongst the text, each themed to the chapter.

The book is based on the author's diaries, which are freely quoted and it is brimming with facts and figures: early and late dates, peak counts, firsts of the year, length of time in cop, etc. This information is of great interest to many but I would prefer to see it simply tabulated, or significantly pruned, as it can become a little tedious to read. In fact the only table in the book is a subjective and eccentric list of "Butterfly of the year", perhaps a gentle snub to science. The author tells us at the start this is not to be an autobiographical work but the times when he forgot this rule produced my favourite passages. His interest and enthusiasm is total and it is quickly clear that he has arranged his life to be amongst the butterflies. With so much information it is difficult to assess how well proofed the book is and just a couple of things jumped out at me. Ham Hill is in fact near "Stoke sub Hamdon" (p. 32) and the Verrall Supper is, of course, hosted by the Entomological Club not the Royal Entomological Society (p. 102).

Ex-collectors can be as self-righteous as ex-smokers but Oates manages to avoid this and even laments the divide or "unhealed rift", which he believes was created by legislation. He is in the rather enviable position of being 'licensed to carry a net' (whilst on official business) and discusses this with balance and sensitivity. It is a common concern that too much emphasis and eulogising on butterflies and their high visibility conservation is diverting attention not only from other Lepidoptera but also from all other invertebrates. However, the author's thesis is that if we can use butterflies as symbols to hold up and engage the public, then by their conservation other ("less huggable") species may be saved too. Oates is openly critical of much conservation effort, suggesting too much emphasis has been placed on pure ecology and believes that the problem is one of "mending our relationship with nature".

It is likely that this genre of nature writing (within our interest) will grow and replace the pure 'Local List' phenomena of the past few decades. This is a book for fans of nature writing and butterfly enthusiasts.

MARK A. YEATES

PLATE 13. Fig. 1 *Paropsisterna selmani* male summer adult, dorsal view showing part of the dorsal diamond shape on the apical half of the combined elytra. Fig. 2 *Paropsisterna selmani* summer adult, lateral view showing the distinct bright yellow marginal line on the right elyton. Fig. 3 *Paropsisterna selmani* fully-grown fourth instar larva. Fig. 4 *Paropsisterna selmani* larval feeding damage

PLATE 14, Fig. 1. Adult Tree Cricket *Oecanthus pellucens* at Dungeness, 2015. Fig. 2. *O. pellucens* nymph, sunning, at Dungeness, 2015. Fig. 3. A male Sickle-bearing Bush-cricket *Phaneroptera falcata* at Dungeness, Kent 2015. Fig. 4. The ant lion *Euroleon nostras* captured in Colin Turley's light-trap at Lydd, Kent. All photos supplied by D. Walker.

PLATE 15. *Arctornis l-nigrum*, second-generation larvae ex female, Pont de la Marquèze, southern France, G Boggis, viii.1994. Fig. 1. First instar, 6.ix.1995. Fig. 2. Third instar, newly moulted, 10.x.1995. Fig. 3. Third instar, pre-diapause, 13.x.1995. Figs. 4 & 5. Fifth (last) instar, 21.vi.1996. Illustrations ($\times$1.5), G. M. Haggett.

PLATE 16. Fig. 1. *Elbella* sp. (Evans) drinking moist sediments on a logging road sand bank. Fig. 2. *Lasaia sp.* (Bates) also feeding on damp sand bank. Fig.3. *Colobura dirce dirce* (L) on a dead leaf. Fig. 4. *Prepona amydon* (Hewitson) perched on a branch in the understory. All photographs were taken at the Floresta Nacional do Jamari, Rondonia, Brazil. Photo credits: Matthew D. Linley.

THE DISCOVERY AND SIGHTINGS OF THE TREE CRICKET *OECANTHUS PELLUCENS* AND SICKLE-BEARING BUSH-CRICKET *PHANEROPTERA FALCATA* AT DUNGENESS, KENT IN 2015

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ABSTRACT

An account is given of the discovery in 2015 of two unusual orthopteran species at Dungeness National Nature Reserve, Kent (VC 15). The Tree Cricket *Oecanthus pellucens* (Scopoli), a member of the family Gryllidae subfamily Oecantinae, appears to be established on a shrubby area of shingle some distance from the sea and is new to Britain. A small population of the Sickle-bearing Bush-cricket *Phaneroptera falcata* (Poda), a known temporary colonist, was subsequently discovered in the vicinity.

TREE CRICKET

On the evening of August 20th 2015 Roger Morris and I were walking back to the Bird Observatory at Dungeness from the Pilot Inn at Lydd-on-sea. Due to a number of chance circumstances we found ourselves at the south-east corner of the large area of Sallow bushes (*Salix cinerea* ssp. *oleifolia*) in which the Bird Observatory maintains a bird-ringing programme just as it was getting dark. We were suddenly stopped in our tracks by the sound of a singing cricket from a nearby bramble bush with which I was vaguely familiar (having heard it on the Mediterranean coastline before) but realised it was a sound that should not be coming from the British countryside. As we had no torches or collecting pots and I had an early start the next morning we had to leave it at that and wait until I could next visit the site. The 22nd August was a very hot day by Dungeness standards so myself and three friends (Gill Hollamby, Tim Cleeves and Steve Holliday) went back to the area at around 1900h. As we approached the general area we immediately heard the song again but it was now obvious that there were several individuals present as singing was heard from a number of spots. It took a while but we were eventually able to see a few individuals and finally catch one. As the darkness fell the song built to a chorus around us and we returned to the Observatory to check out the literature and the online app "iRecord Grasshoppers". It did not take long to identify our cricket as a Tree Cricket *Oecanthus pellucens* (Scopoli) (Gryllidae) (Plate 14, Figs 1 and 2).

Over the following weeks I spent most suitable evenings surveying the site and taking interested parties out to look for the crickets. It became apparent that there were probably well in excess of one hundred individuals present (perhaps many more) but that they were restricted to a fairly well defined area with a few satellite individuals just outside the core area. Singing usually started about 30 minutes before sunset and built to a crescendo about an hour after sunset. Despite lots of singing individuals they were still hard to find as they tended to do so from the underside of leaves and were difficult to see and often stopped singing if you approached too closely. On very warm days singing was sometimes heard from mid-afternoon but no singing was heard at dawn or during the morning. It was sometimes possible to find individuals sunning themselves on bramble leaves around

mid-morning but it was only ever the occasional individual. Both males and females and also nymphs were found thus confirming that there was a genuine breeding population present. It is likely therefore that the species would have been present at Dungeness prior to 2015 but I doubt that it would be more than a couple of years.

Males were easily separated by the presence of large, flattened and strengthened wings which were laid across the body. The wings of the females were less developed and laid parallel to the body.

The song was a loud, purring chirp easily audible to most people and carried over some distance and had a ventriloquistic effect making it hard to pin-point the individual exactly. Due to its frequency the song was not picked up on two of the bat detectors we had available and on the third set up, a Wildlife Acoustics Echo Meter, it picked up the song but rejected it as "noise" and would not record it. Recordings of the song were made on iPhone and by using the video mode on Canon Powershot SX60HS and Nikon Coolpix C610 cameras. When singing the wings were raised perpendicular to the body and brought together forming what appeared to be a parabolic reflector and with the wings vibrating rapidly together. Whilst singing, the male was also observed exuding a nuptial offering from the base of the wings which attracted the female into the correct position for sperm transfer (in the form of a spermatophore) to take place.

Feeding took place after dark with individuals frequently rising to the tops of the taller plants and they were seen to eat pollen from Wild Parsnip *Pastinacia sativa*, Teasel *Dipsacus fullonum* and Common Knapweed *Centaurea nigra* and Ragwort *Senecio jacobaea* and were sometimes seen in small aggregations.

Habitat

The colony covered approximately 150m × 50m with a few more isolated individuals outside the core area. The site was on shingle and was bordered on two sides by slightly raised banks with a rich flora including Bramble *Rubus* sp agg, Gorse *Ulex europaeus*, Broom *Cytisus scoparius*, Wild Parsnip, Wood Sage *Teucrium scorodonia,* Common Knapweed and Teasel and also Purple-loosestrife *Lythrum salicaria* in some ancient depressions. Interestingly, despite its English name of Tree Cricket I never heard or saw one in a tree (i.e. nearby Aspen *Populus tremula* or *Salix cinerea* ssp. *oleifolia*).

A few specimens were captured and kept in a terrarium so that they could be filmed for the BBC One Show. Whilst in the terrarium one of the females laid a batch of eggs in a series of holes down the length of a stem of Marjoram *Origanum vulgare* which had been placed there. Despite several searches I have not been able to find any signs of egg-laying at the site so far.

There have been two previous British records of Tree Cricket, at Cambridge in 1996 and Stockbury near Sittingbourne, Kent in 2005 (R. Moyse, pers.comm.). A breeding colony was found in Jersey in 2010 (David, 2013). Given the location of this colony it seems most likely that the first insect(s) arrived "unaided" except for a favourable easterly wind.

Sickle-bearing Bush-Cricket

The whole story took a surprising turn on the evening of August 26th. I was surveying for *O. pellucens* by torchlight when I chanced upon a large, long-winged bright green cricket which I immediately recognised as a Sickle-bearing Bush-cricket *Phaneroptera falcata* (Poda) (Tettigoniidae) (Plate 14, Fig. 3). Over the next five

weeks or so an estimated total of nine females and two males were found (maximum number per individual sighting, four females and one male). These were much more restricted in range with all of them coming from a narrow, raised bank covered in bramble, Wood Sage, Knapweed and Wild Parsnip – in fact most sightings came from a single bramble bush. I only heard what I thought was one individual singing on one occasion and this was only detectable using a bat detector.

The identification was fairly straightforward. A large green cricket with very long, also green, wings in both sexes. The female bears the sickle-shaped ovipositor of its name whilst the cerci of the male are short, rounded and curved upwards. Some care was needed when ascertaining the sex of individuals under field conditions as the cerci/ovipositor were often hidden inside the folded wings. The possibility that they were Southern Sickle-bearing Bush-crickets *Phanoptera nana* Fieber was considered but eliminated by the shape of the ovipositor (Harz, 1969; Fontana *et al.*, 2002; Collins *et al.*, 2007).

The only other breeding record for this species was at Hastings Country Park, East Sussex between 2006 and 2008 (Collins *et al.*, 2007). Further singletons have been recorded from the New Forest, Hampshire in 2006 (Sutton, 2006), at Dungeness, Kent in 2009 (Sutton, 2010a), from the Humber Estuary in East Yorkshire in 2010 (Sutton, 2010b) and Studland, Dorset in 2012 (Sutton, 2012). The evidence for the East Yorkshire record strongly points to *P. falcata* but it is impossible from the photograph of a male provided by Barry Warrington to rule out the closely related species *P. nana*. Females of *P. falcata* are fully-winged and relatively strong fliers and it seems likely that at least one fertile female may have made its way unaided to Dungeness from the near continental mainland where it has been extending its range north-westwards over recent decades (Beckmann & Sutton, 2015).

The last nocturnal visit to the site was made on October 3rd 2015 when large numbers of *O. pellucens* were swept but only two individuals were heard singing and a single female *P. falcata* was seen.

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References

Beckmann, B. & Sutton, P. 2015. Sickle-bearing Bush-cricket *Phaneroptera falcata*. *Grasshoppers and related species Recording Scheme of Britain and Ireland Newsletter* **32**: 9–10.

Collins, G. A., Hodge, P. J., Edwards, M. & Phillips, A. 2007. Sickle-bearing Bush Cricket, *Phaneroptera falcata* (Poda) (Orthoptera: Tettigoniidae), breeding in South-East England. *British Journal of Entomology and Natural History* **20**: 133–137.

David, C. 2013. *Oecanthus pellucens* in the Channel Islands. *Orthoptera Newsletter* **29**: 6.

Fontana, P., Buzzetti, F. M., Cogo, A. & Odé, B. 2002. Guida al riconoscimento e allo studio di cavalette, grilli, mantidi e insetti affini del Veneto (Blattaria, Mantodea, Isoptera, Orthoptera, Phasmatodea, Dermaptera, Embiidina). *Guida Natura* **1**: 1–592.

Harz, K. 1969. Die Orthopteren Europas vol. 1. *Series entomologica* **5**: 1–749.

Sutton, P. 2006. Wildlife Reports: Grasshopper and relatives. *British Wildlife* **18**: 53–54.

Sutton, P. 2010a. Wildlife Reports: Grasshopper and relatives. *British Wildlife* **21**: 201–202.

Sutton, P. 2010b. Wildlife Reports: Grasshoppers and relatives. *British Wildlife* **22**: 49–51.

Sutton, P. 2012. Wildlife Reports: Grasshoppers and relatives. *British Wildlife* **24**: 126–127.

FURTHER ILLUSTRATED STUDIES OF LEPIDOPTERA LARVAE: *ARCTORNIS L-NIGRUM* (MÜLLER), THE BLACK V MOTH (EREBIDAE: LYMANTRIINAE)

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Introduction

There are some moths that hold for each of us some special affection, species that have over a lifetime of collecting and study retained their individual charm and attraction; such a species for me is the Black V moth, *Arctornis l-nigrum* (Müller), which evokes youthful memories of watching a moth come to a vertical white sheet illuminated by a 100-watt tungsten bulb. This insect was a migrant male on 7 July 1946 at Arundel, Sussex; it was clearly green-tinged when taken and remained as fresh but without that delicate hue when it was given to the National Collection a few years later. Since then the story of the species' temporary residence at Bradwell-on-Sea in Essex was recorded by Dewick (1978) who had the pleasure of seeing the insect there over a span of fourteen years. He recorded the moth at light annually from 1947 until 1960, both on his farm and from a few miles distant; during that time he found one wild larva feeding on elm and reared a brood on lime by overwintering larvae from a wild-caught female. He suggested the origin of this colony may have been during the same migration of 1946. This well-documented record of temporary colonisation is noteworthy as an example of a species at the edge of its territory on the mainland of Europe that may on occasion find conditions suitable for residence in Britain, although since that time there have only been two further records, one of a migrant male in Kent in 2006 (Clancy, 2008; Clancy, Top-Jensen & Fibiger, 2012) and another on the Isle of Wight in 2015 (S. A. Knill-Jones, *pers. comm.*).

Larval studies

In 1995 I received newly-hatched larvae and a few second-instar larvae from John Ward, being progeny of moths reared from eggs laid by a female taken by G Boggis at Pont de la Marquèze in southern France in August 1994. The first-instar larvae were remarkable for their astonishing ability to leap up to fully 50 mm. The larger larvae began to lie up for winter in mid September when in their third instar; the others were in their first and second instars at that date and carried on feeding until they too were in their third instar in mid October when they also entered diapause. All these larvae without exception sought a curled leaf of Small-leaved Lime (*Tilia cordata*) in its autumn colour and settled down on a well-woven silken pad, some curled, the rest in a straight line. They became increasingly difficult to see since they so greatly resembled irregularly browned patches on the face or at the edge of the lime leaves.

Two overwintering treatments were tried, one in a net-topped cage with autumnal lime twigs and plenty of fallen leaves but from which there were no survivors, the other in two plastic boxes on autumnal lime foliage which yielded a sole survivor that moved on to fresh lime foliage on 28 May 1996 and fed a little and passed frass; it then fed freely on both *T. cordata* and *T. x europaea*. At this time the body showed marked constrictions between rings 4/5 and 10/11 so that it seemed divided into three

unequal portions with head and thorax as one furry ball. Further moults were passed on 8 and 17 June.

The larva (Plate 15, Figs. 1–5) is a most charming and striking creature, quite unlike any indigenous British hairy larva. The dorsal hair tufts are reminiscent of tussock moths such as *Calliteara pudibunda* (L.) and the head and prothoracic hairs and body tubercles are also characteristic of the family 'Lymantriidae', now reduced to subfamily Limantriinae of family Erebidae (Agassiz *et al.*, 2013). In its third and fourth instars the larva adopts a characteristic stance with raised thorax and the latter abdominal rings standing high on extended prolegs; in its fifth instar it rests in a more conventional posture, its appearance dominated by the large egg-shaped cluster of thoracic hairs and the spiky white dorsal plumes – a real dandy of a lepidopterous larva.

The pupa is a uniform pale green colour with black streaking about the wing cases and not blackish in overall appearance as described by de Worms (1979). The larval description given by de Worms should be amended to read "tussocks of white hairs on abdominal segments 1, 2, 6, 7 and 8 and of reddish hairs on segments 3–5 and again on segment 11"; the head is not black but predominantly yellowish. I found that all 41 larvae entered into diapause in their third instar and not in the first as stated by de Worms.

Third instar larva pre-diapause:

Body velvety black with a double dorsal pale-brown line and much whitish mottling laterally with all but the thoracic and rings 9 and 10 so densely clothed in hair that much of the body surface is hidden (see Plate 15, Fig. 2). Pale or whitish hair pencils dorsally on abdominal rings 1 and 2 and again on 6, 7 and 8, and looser ginger-brown tufts dorsally on rings 3, 4 and 5, with all lateral tufts of the same colour. Head and anal ring with longer hairs, blackish at the head, black and brown on rings 10–12. Anal claspers displayed toward the posterior and blue-black with yellow flecks. Head with tight light-brown fringe pressed tightly to its top.

Fifth (last) instar:

Length to 40mm. Larva characterised by the extraordinary density of red-brown hairs on the thorax with rows of paler verrucae and by the white plumes dorsally on abdominal rings 1, 2, 6, 7 and 8 that contrast with the red-brown tussocks on other rings (Plate 15, Figs 4 & 5). Ground colour black without orange mottling only on the dorsum of abdominal rings 7 and 8 and less conspicuously on rings 1 and 2. Rest of body and especially laterally heavily mottled orange with black stippling and some black vertical streaking, the sub-segments of the mid-abdominal rings outlined in black rather like epaulettes. Ring divisions pale lemon but freckled black. A bold lateral flange of bright orange-yellow bearing a pale rose verruca at the centre of each ring, the flange swept upwards to arch at the ring division before descending into the next ring, its general appearance resembling an exaggerated sinuous band. A fine black medio-dorsal line much obscured by dorsal hair tufts but very clearly expressed on abdominal rings 1–3 and again on rings 6–8, the line swelling at ring divisions and finely bordered in bright orange. Orange colour repeated as a broken subdorsal line with much mottling in the same colour and bluish-black laterally grading into orange dusting at the lateral verrucae. Large lateral verrucae pale pinkish set with light brownish hairs, but blanched on abdominal rings 1, 2, 6, 7 and 8 to match the dorsal plumes. Dorsal hair tufts of two forms, the white plumes of abdominal rings 1, 2, 6, 7

and 8 drawn into a pointed apex and uniformly white except for a rosy base, the tufts of the remaining rings open at the top, rather more squared and red-brown in colour. Meso- and meta-thoracic rings with a ring of pale verrucae supporting long blackish silky hairs as well as shorter red-brown hairs, both projected flatly forward to form a tight, dense oval hair-mass when the larva is at rest. Prothorax with a stalked verruca at each side of the head and also well furnished with red-brown hairs as well as its dense fringe of clear yellow hairs. A further ring of pale verrucae on abdominal ring 9 and this, too, with long, silky, black hairs directed flatly to the rear but not as densely as on the thorax, the hairs of the verrucae being red-brown and very much shorter. Long, black, silky hairs of the thorax and last rings about twice as long as those of the rest of the body, including the dorsal white and brown tufts. Skin ventrally black at ring divisions especially of the first three rings, elsewhere orange-red at centre of ring and on the well-developed, raised, fleshy internal proleg surface that nearly meets its partner at the centre. Head pale yellowish with prominent black vertical streaks in front and again laterally, the frons narrowly black outlined yellow; the head closely protected above by its dense canopy of short, forwardly-directed pale-yellow hairs and to each side by a rather looser but still formidable rank of red-brown hairs, thus appearing snugly fitted into a ruff and cap within the larger mass of long, silky black and shorter red-brown thoracic hair. True legs dark reddish-brown and hidden within the thoracic hair except when the larva is active; prolegs and anal claspers unusually long, dark red-brown each with a rosy verruca toward the base, its pale-grey foot much extended in the form of a letter T. Spiracles narrowly oval and black, largely obscured by body hair.

References

Agassiz, D. J. L., Beavan, S. D. & Heckford, R. J. 2013. *A checklist of the Lepidoptera of the British Isles*. Field Studies Council, Telford.

Clancy, S. P. 2008. The immigration of Lepidoptera to the British Isles in 2006. *The Entomologist's Record & Journal of Variation* **120**: 209–276.

Clancy, S., Top-Jensen, M. & Fibiger, M. 2012. *Moths of Great Britain and Ireland*. Bugbook, Oestermarie, Denmark.

Dewick, A. J. 1978. *Arctornis l-nigrum* (Müller, O.F., 1764) (Lep.: Lymantriidae): The Black V Moth – a Possible Occasional Resident Species in Britain. *The Entomologist's Record & Journal of Variation* **90**: 223–225.

de Worms, C. G. M. 1979. Lymantriidae *in* Heath, J. & Emmet, A. M. (Eds.), *The Moths and Butterflies of Great Britain and Ireland,* volume 9. Harley Books.

We welcome back Gerry Haggett as author, after an interval of 35 years. Between 1955 and 1980 he wrote eleven papers for this journal, then called the *Proceedings and Transactions of the South London* [later *British*] *Entomological and Natural History Society*. All were illustrated studies of Lepidoptera larvae. In 1981 these papers were brought together and published by this Society as a book, entitled *Larvae of the British Lepidoptera not figured by Buckler*. The reference to Buckler is to *The larvae of the British butterflies and moths* by William Buckler, published posthumously by the Ray Society in nine volumes between 1886 and 1901.

EDITOR

Hering Memorial Research Fund Report

BUTTERFLIES AND LOGGING: AN UNEXPLORED RELATIONSHIP

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ABSTRACT

Over the past two decades the region of Rondonia in the Brazilian Amazon has lost more than 30% of its forest cover to logging. This vast region is home to more than 1500 butterfly species, making it one of the most biodiverse hotspots in the world. Thus, understanding the impacts of different logging techniques on butterflies is of critical importance to preserve these charismatic insects and the coexisting biodiversity. In this project, part funded by the British Entomological and Natural History Society, work has been carried out alongside logging companies to devise logging techniques that minimize impacts on biodiversity, using fruit-feeding butterflies mainly of the Nymphalidae as a study system. Approximately 200 species of butterfly were recorded and more than 5000 butterflies were photographed for comparison between logging strategies. The investigation is at the data analysis stage and full results will be published in an applied ecological journal in the coming year, one hopefully in Conservation Biology. Members of the British Entomological and Natural History Society will be able to access these papers via the author when they are published.

STUDY

Tropical forests are logged excessively, despite being the most diverse terrestrial biomes on Earth, with over 400 million hectares designated to timber production (Putz *et al.*, 2012). Logged forests are now more widespread than old-growth, the exception is the vast Amazon rainforest, yet Brazil has just opened up 50 million hectares of Amazonian 'National Forest Reserves' for logging – 25 times the size of Wales. A key question is how to manage the burgeoning Amazonian logging industry to retain biodiversity at minimal opportunity cost (Edwards *et al.*, 2014). In this project we assess the impacts of different logging intensities on butterfly diversity and abundance to design a reduced impact strategy that minimizes biodiversity loss.

In the summer of 2015, GMK and research assistant Matthew Linley, spent three months in a logging concession located in Rondonia (Brazil) studying butterfly communities. Dr David Edwards (University of Sheffield) and Professor Carlos Peres (University of East Anglia) have started a collaborative project with AMATA Brazil, a company that has indicated a desire to log in a sustainable manner.

Two different management systems for logging in tropical forests have been proposed in the literature: *land-sharing* versus *land-sparing*. The land-sharing strategy combines low-intensity logging across whole concessions with biodiversity protection through low-impact logging techniques. In contrast, land-sparing consists on high-intensity logging in small areas while protecting intact primary forest throughout the concession (Fig. 1; Edwards *et al.*, 2014). Both strategies will ultimately yield the same amount of timber and profit, but differ in how wildlife is retained in logging

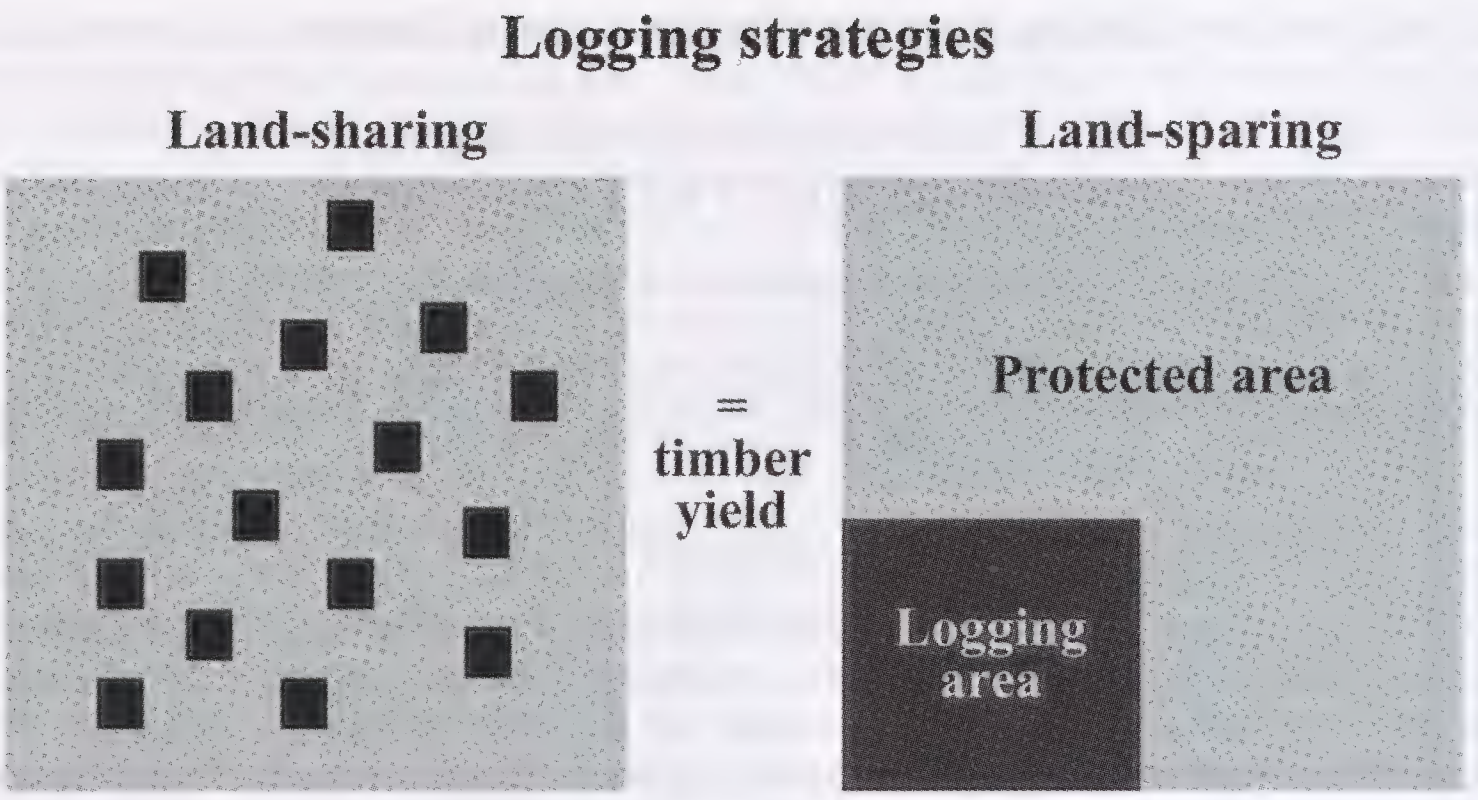

Fig. 1. Land-sharing *vs.* land-sparing logging strategies. The large grey squares represent a logging concession and the black squares are logged trees.

concessions. However, no studies have compared the impacts of these two strategies on forest biodiversity in the Neotropics.

Butterflies have long been used as ecosystem indicators, both because of their rapid and sensitive response to environmental disturbance and also as predictors of other species' diversity (Brown, 1991; Schulze *et al.*, 2014). Butterflies represent a novel study system in the land-sharing land-sparing debate with the potential to assess the impacts of logging on the Amazon's unique biodiversity. The study presented here alongside projects on other taxa will inform AMATA directly and the scientific community on the most "environmentally-friendly" logging strategy at a minimal opportunity cost.

Methods

We used fermented banana-baited traps to attract a range of species, mainly from the Nymphalidae family. Banana was mixed with a local sugar cane drink and left in the sun in a sealed container for 24 hours. Fourteen separate areas were studied, six that have never been logged before and eight selectively logged at different intensities, ranging from three to ten felled trees per hectare. Each study area was a 50×100m rectangular plot with six baited butterfly traps distributed along the sides (Fig. 2). Traps were open for 16 days and visited every 48 hours to replace the bait and record trapped butterflies. All butterflies collected in the baited traps were photographed in the field, marked by carefully removing scales from a different area of the wing on each collection day, and released. The marking technique enabled us to identify recaptured butterflies and avoid double records. Statistical analyses and logging mathematical models will be performed using the base package for R statistical freeware (R Core Team, 2014).

Results and Discussion

Overall we trapped and photographed in the field 5157 butterflies, of which 705 were recaptures, comprising approximately 200 species across the logging concession

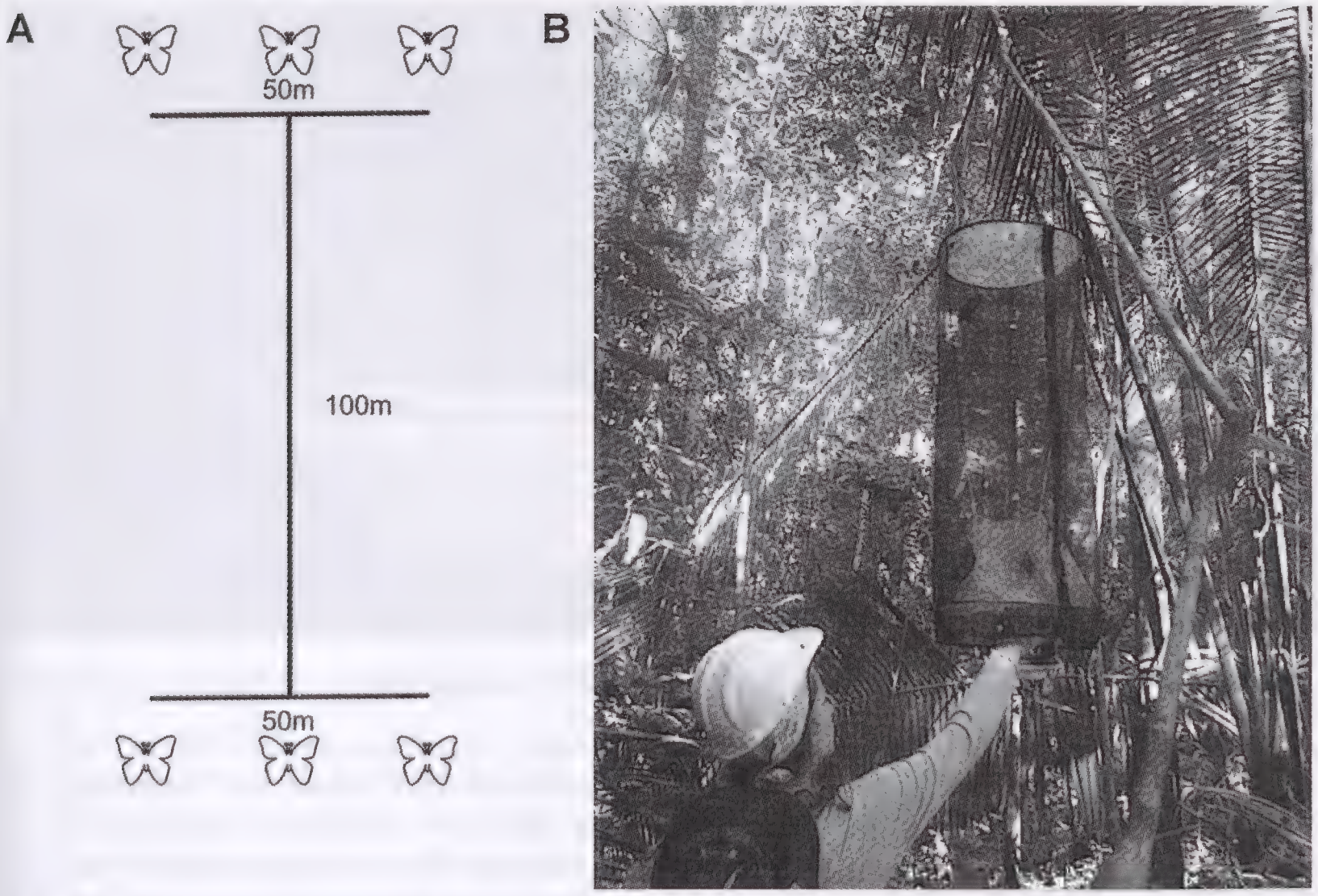

Fig. 2. Summarized methods. Location of butterfly traps within the plot (A) and a standard baited butterfly trap 2m above the ground (B).

(Plate 16, Figs 1–4). Species recorded included those with a wide distribution such as *Morpho helenor theodorus* (Fruhstorfer), *Colobura dirce dirce* (L.), *Archaeoprepona demophon muson* (Fruhstorfer) and *Temenis laothoe laothoe* (Cramer). We also trapped many species with smaller ranges, such as *Cartea vitula tapajona* (Bates) (Riodinidae), *Memphis leonida* (Stoll) and *Pyrrhogyra amphiro amphiro* (Bates). Interestingly we recorded two subspecies of *Heliconius ethilla* (Godart), ssp. *narcaea* (Godart) and ssp. *jaruenses* (Brown), in the same locality. A revised survey of butterflies of Rondonia will also be published, as a number of species found during this expedition have not been recorded there before (see Emmel & Austin, 1990).

Once butterfly identifications are completed, we will model mathematically the effects of land-sharing versus land-sparing scenarios on butterfly abundance and species diversity across the concession. Preliminary observations show that a higher

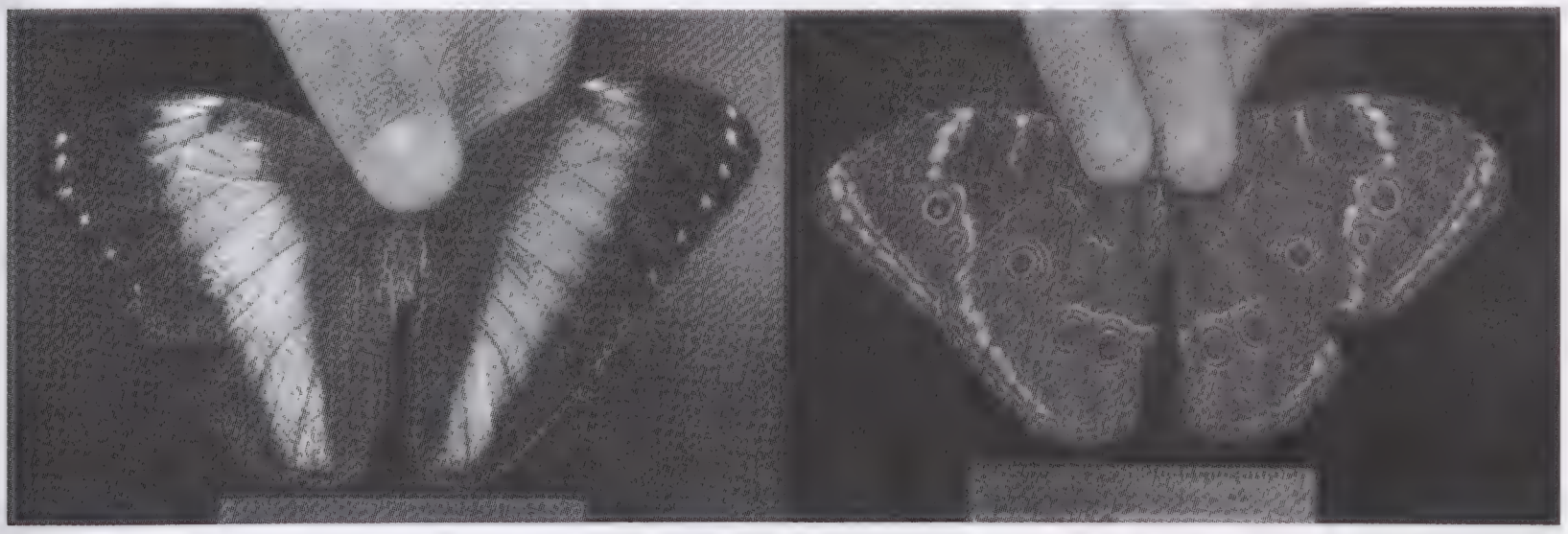

Fig. 3. Example of a butterfly captured, photographed and released in the field. *Morpho helenor theodorus* (Family: Nymphalidae).

Fig. 4. A range of butterfly species feeding on fermented banana bait at the base of a standard bait trap.

number of butterflies were recorded in sites with intermediate to high logging intensities, and that the species composition in these differed markedly from communities in primary unlogged forest. The changes that logging triggers on the forest's spatial structure may underpin these findings, whereby the removal of the canopy allows species that would not normally penetrate the understory to reach the baited traps.

In this project we have developed a novel approach to assess the impacts of the ever-growing logging industry in the Neotropics through the study of a charismatic and ecologically important group of insects. Furthermore, the results promise to fill a major gap in our knowledge of the best ways to minimize wildlife disturbance with a cost-effective logging model. Scientists need to urgently collaborate with logging companies and government agencies to protect the highly valuable yet critically threatened biodiversity of the Amazon.

Acknowledgements

I thank Dr David P. Edwards (University of Sheffield), Dr Dayana Bonfantti (Brazilian collaborator, Universidade Federal do Parana), Matthew D. Linley (University of Sheffield), and the editors of this journal for helpful discussions and comments on this manuscript. The Professor Hering Memorial Research Fund from the BENHS provided funds to acquire 30 high quality butterfly bait traps from BugDorm and many other pieces of equipment that have resulted in a highly efficient field season.

I also wish to thank the Animal and Plant Sciences Department (University of Sheffield), in particular the Righ Fellowship and the Scurfield Bursary schemes, for financial and logistical support and AMATA Brazil for their genuine interest in collaborating with scientists. The (US) Explorers Club Youth Fund also kindly contributed financially to the project.

References

Brown Jr, K. S. 1991. Conservation of Neotropical environments: Insects as indicators, pp. 349–404. In: Collins N. M. and J. A. Thomas (eds.) *Conservation of insects and their environments*. Academic Press. London.

Edwards, D. P., Gilroy, J. J., Woodcock, P., Edwards, F. A., Larsen, T. H., Andrews, D. J. R., Derhé, M. A., Docherty, T. D. S., Hsu, W. W., Mitchell, S. L., Ota, T., Williams, L. J., Laurance, W. F., Hamer, K. C. & Wilcove, D. S. 2014. Land-sharing versus land-sparing logging: reconciling timber extraction with biodiversity conservation. *Global Change Biology* **20**: 183–191.

Emmel T. & Austin G. 1990. The tropical rainforest butterfly fauna of Rondonia, Brazil: species diversity and conservation. *Tropical Lepidoptera* **1**: 1–12.

Putz, F. E., Zuidema, P. A., Synnott, T., Peña-Claros, M., Pinard, M. A., Sheil, D. & Zagt, R. 2012. Sustaining conservation values in selectively logged tropical forests: the attained and the attainable. *Conservation Letters* **5**: 296–303.

R Development Core Team. 2014. R: *A Language and Environment for Statistical Computing, Vienna, Austria.* Available at: http://www.R-project.org/.

Schulze, C. H., Waltert, M., Kessler, P. J., Pitopang, R., Veddeler, D., Mühlenberg, M. & Tscharntke, T. 2004. Biodiversity indicator groups of tropical land-use systems: comparing plants, birds, and insects. *Ecological Applications* **14**: 1321–1333.

SHORT COMMUNICATION

The ant lion *Euroleon nostras* (Fourcroy) (Neuroptera: Myrmeleontidae) on the east Kent coast. – One of us (TH) set up a MV light trap at St. Margaret's Bay, east Kent on the night of 12th September 2015 in order to record migrant Lepidoptera. A wide range of lepidopterous species was recorded but the most exciting arrival of the night was a single specimen of the ant lion *Euroleon nostras* (Fourcroy). This appears to be the only individual recorded that night even though other traps were in operation. Details of the capture were passed to JSB and to the Kent & Medway Biological Records Centre with a view to publishing the record along with a summary of recent records of this species in the county. David Walker (DW) of the The Observatory at Dungeness very kindly provided additional records from the Dungeness area and a photograph of one of the captured specimens (Plate 14, Fig. 4).

The records (all from light-traps) are as follows:

The Observatory, Dungeness, 2.ix.1998, G. Hollamby and David Walker (Plant, 1997; KMBRC); Greatstone, 1.viii.2004, Barry Banson (DW); Lydd, 13.viii.2004, Colin Turley (DW); Lydd, 17.viii.2004, Colin Turley (DW); Lydd-on-sea, 4.ix.2013, Dorothy Beck (DW): St Margaret's Bay, 12.ix.2015, T. Harman.

It is not too surprising that all of the Kent records for the ant lion are from eastern coastal localities, where dispersing insects from the continental mainland are more likely to be encountered, and where, when prevailing winds presage migrant insect activity, many more light-traps than normal are operated. Disappointingly there are no records from the Isle of Sheppey which has long east-facing beaches and can act as a focal point for many insects migrating up or across the Thames estuary. The records, restricted to the past two decades, suggest the ant lion is probably a recent migratory species to southern England, as Dungeness has been a popular site for recording insect migrant activity throughout the second half of the 20th century (though little before). Although the number of ant lion records is relatively small it is likely the total number of migrating *E. nostras*, for example during the period August 2004, may well be sufficient to establish a breeding colony in Kent. Local climate and habitat conditions are favourable. The climate on the Dungeness peninsula is sunnier and warmer than most other localities in Kent, though it can be colder than inland areas owing to its exposed location. The microclimate at ground level at Dungeness

is more characteristic of regions much further south on the continental mainland (JSB, pers.observ.). Ground temperatures on the sandy-shingle surface on a sunny day can be in the range of 35–40°C and 7°C warmer than in air 2 cm above ground level. Even 2 cm below the surface, temperatures can be up to 5°C higher than the air just above the ground. The microclimate is therefore likely to be amenable to *E. nostras*. It should be noted that these measurements were made in an area of lightly vegetated shingle where pebbles (the main component of Dungeness shingle) are able to absorb, store and release large quantities of heat whereas *E. nostras* prefers more sandy dominated habitats in which to develop and construct larval pits (Plant, 1999). There are many sandy patches to be found further inland through to Lydd town well away from the pioneer shingle ridges and it is these that should be searched for larval pits to confirm colony establishment. Sites that include tall vegetation, particularly Scots Pine *Pinus sylvestris* appear to be favoured (Plant, 1999). Sandwich Bay which has a scattering of trees on sandy soil close to the sea (much of which is privately-owned and rarely visited) may well turn out to be a more suitable area for finding the ant lion.

Sadly, Tony Harman died before this note could be completed. He was always keen to record Lepidoptera in Kent and this brief note on a highly notable insect, indeed larger than most of his beloved moths, is a fitting reminder of his many days (and nights) spent in the field.

TONY HARMAN, Turville Heath Farm, Turville Heath, Henley-on-Thames, Oxfordshire RG9 6JY & JOHN BADMIN, Coppice Place, Selling, Kent ME13 9RP.

REFERENCES

Plant, C.W. 1997. British ant lions . . . again. *Neuro News* **20**: 4–5.
Plant, C.W. 1999. Welcome. *Neuro News* **23**: 1.

The Biodiversity Heritage Library

The Biodiversity Heritage Library (BHL) is a consortium of natural history and botanical libraries organised via the Smithsonian that cooperate to digitise the literature on biodiversity and make this available for open access and responsible use as a part of a global "biodiversity commons". The British Entomological and Natural History Society was approached by the Biodiversity Heritage Library in 2010 and agreed to allow its current journal and two previous titles to be digitised for open access. The complete set of *The Proceedings of the South London Entomological and Natural History Society*, *Proceedings and Transactions of the British Entomological and Natural History Society* and *The British Journal of Entomology and Natural History* up till 2004 is now accessible online for reference purposes. There is a 10-year delay on digitisation, meaning that only paid-up members of the Society receive copies of the most recent issues of *The British Journal of Entomology and Natural History*.

The BHL Portal (*http://biodiversitylibrary.org*) allows users to search the stored literature through multiple access points, read the texts online, or download selected pages or entire volumes as PDF files. You can zoom in or out of pictures as you wish, which is great for detail. Try it.

JOHN BADMIN

CARCELIA ILIACA (DIPTERA: TACHINIDAE), A SPECIFIC PARASITOID OF THE OAK PROCESSIONARY MOTH (LEPIDOPTERA: THAUMETOPOEIDAE), NEW TO GREAT BRITAIN

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ABSTRACT

Carcelia iliaca (Ratzeburg) is added to the British list based on a specimen collected from Richmond Park in Surrey in 2014. Morphological features distinguishing *C. iliaca* from other tachinid species are presented, along with notes on its known distribution and biology. The Cytochrome c oxidase subunit I (COX1) DNA sequence unique to *C. iliaca* was characterised to provide a specific molecular tool for future identification.

INTRODUCTION

Carcelia iliaca (Ratzeburg) is a monophagous parasitoid of the Oak Processionary Moth *Thaumetopoea processionea* (L.). Its host *T. processionea* is native to central and southern regions of continental Europe, but was introduced accidentally to Great Britain on imported oak trees (*Quercus robur* var. *fastigiata*) in 2006 (Townsend, 2013). These introductions led to the establishment of *T. processionea* at two sites in west London (Townsend, 2013). From these initial foci, *T. processionea* increased and expanded its range, despite an extensive control programme coordinated by the Forestry Commission, and it can now be found across an area covering more than 300 km^2 (Forestry Commission, 2013). Smaller, outlying outbreaks were discovered in Pangbourne, Berkshire, in 2010 and on the border between Croydon and Bromley in 2012. *Thaumetopoea processionea* was first found in Richmond Park in 2009.

The specimen of *C. iliaca* obtained in Richmond Park was captured on 9 June 2014 as it was laying eggs on a larval nest of *T. processionea* on the trunk of an oak tree. Older larvae of *T. processionea* construct a distinctive silken nest during June and July, either on the trunk or on the main branches of the oak tree on which they are feeding, within which they shelter during the day (Maksymov, 1978). The larvae leave the nest at night to feed on the foliage and, when fully grown, they pupate together inside the nest. The adult moths emerge in late July and August.

Carcelia iliaca is recorded from Belgium, Bulgaria, Czech Republic, France, Italy, Iran, the Netherlands, and Turkey (Grison, 1952; Tschorsnig, 1993; Stigter, Geraedts & Spijkers, 1997; Zeegers, 1997; Kara & Tschorsnig, 2003; Ghahari *et al.*, 2008; Hubenov, 2008; Vanhara *et al.*, 2009; Cerretti & Tschorsnig, 2010) but has not been recorded previously from Great Britain. Its addition to the British list increases the total number of *Carcelia* species in Great Britain to nine.

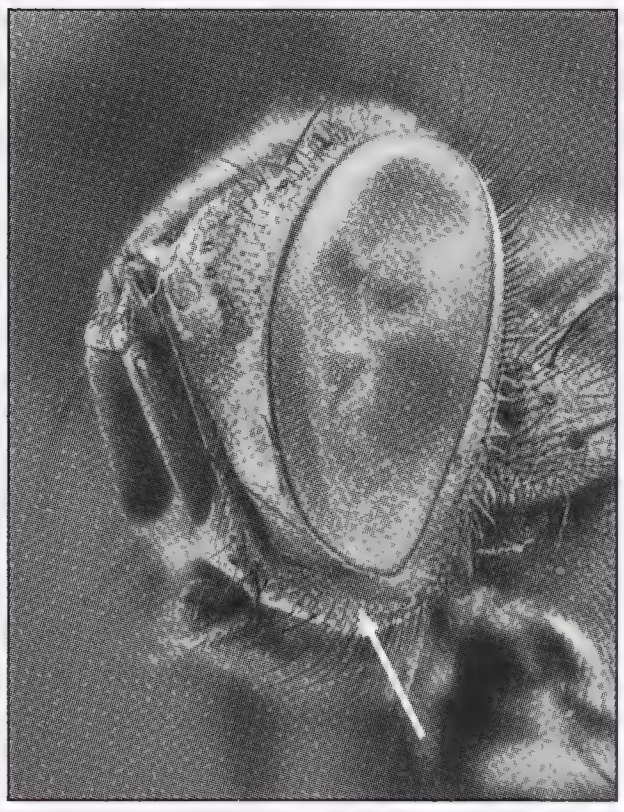


Figure 1. *Carcelia iliaca* is unusual in having much smaller compound eyes than other *Carcelia* species. The gena (indicated by the arrow) is about one seventh the height of the eye.

Distinguishing *Carcelia iliaca* from other tachinids

Carcelia iliaca is a calyptrate fly (having a ptineal suture, transverse thoracic groove and calypytrae/squamae); an oestroid (having hypopleural bristles in front of the hind thoracic spiracle); and a tachinid (having a well-rounded subscutellum). *Carcelia* spp. are usually distinguished by having very large, hairy compound eyes (the gena is usually less than one-tenth the height of an eye when viewed laterally); and a tuft of hairs on the posterodorsal edge of the hind coxae. *Carcelia iliaca* is unusual in having much smaller eyes than other members of this genus (the gena is about one-seventh the height of an eye; Fig. 1) but it still has the hair tuft on the hind coxa.

In the field, *C. iliaca* looks like a very grey-dusted, housefly/bluebottle shaped fly with a tessellated dusting pattern on the abdomen; an orange scutellum with raised apical scutellar bristles; densely hairy eyes; a bent median wing vein; and a body length of approximately 8–10 mm. They have been observed running over the webs and exposed larvae of *T. processionea*, (Sands, pers. observ.) but if searched for they might be found in the general vicinity of active webs and on flowers nearby, such as umbellifers, which are particularly attractive to tachinid flies (*e.g.* Baer, 1920).

Genetic sequencing

Molecular methods offer more powerful ways of identifying species, which can complement and in some cases supersede traditional morphological-based identification methods. DNA-based identification typically uses the cytochrome oxidase 1 (COX1) sequence of the mitochondrial genome, but up until now there has been no COX1 sequence available for *C. iliaca*. Therefore material obtained from the specimen from Richmond Park was used to determine the COX1 sequence for this species and to make this sequence available for future analysis.

DNA was extracted from a single leg using the DNeasy blood and tissue kit (Qiagen, UK). COX1 was amplified for sequencing using the polymerase chain reaction with the primers LCO1490 and HCO2198 (Folmer *et al.*, 1994) and MyTaq Red Mix (Bioline, UK). The thermal profile used consisted of 35 cycles of 95°C for 30s, 52°C for 60s and 72°C for 30s. Sanger sequencing was carried out in both

directions using the PCR primers as sequencing primers by Macrogen Europe (Amsterdam, the Netherlands). Sequences were checked and concatenated in Geneious v5.5 (Biomatters, New Zealand) before submission to GenBank (accession number: KT345964).

Discussion

Carcelia iliaca has one generation each year and lays its eggs on the surface of the silken nests constructed by *T. processionea*. Its larvae then hatch and search actively for late instar *T. processionea* larvae inside the nest (Tschorsnig & Wagenhoff, 2012). High rates of parasitism, of up to 76%, have been reported in Belgium, France and the Netherlands (Grison, 1952; Tschorsnig, 1993; Stigter, Geraedts & Spijkers, 1997). Parasitism rates by *C. iliaca* in Great Britain remain unknown, but are currently under investigation using molecular methods based on the genetic sequence obtained from the Richmond specimen. This work forms part of a wider series of studies on the population ecology of *T. processionea*, which aims to understand how different factors, e.g. habitat, microclimate, stand composition and natural enemies (parasitoids and predators), influence *T. processionea* populations and their impact. The discovery of *C. iliaca* is important for understanding the relationship between *T. processionea* and parasitoids, but it also raises a number of questions. In particular, as its host *T. processionea* appears to have been introduced as egg plaques on imported trees during winter, it is unclear how *C. iliaca*, as a larval parasitoid, was introduced and became established.

To date, the specimen of *C. iliaca* from Richmond Park is the only confirmed example of this species from Great Britain. The full extent of its distribution in Great Britain remains unclear.

Acknowledgements

We would like to thank Forestry Commission England for funding our research on *T. processionea* and the Royal Parks for allowing us to carry out our studies in Richmond Park.

References

Baer, W. 1920. Tachinids as Parasites of injurious Insects. Their Life-History, Economic Importance, and Systematic Characters. *Zeitschrift fur Angewandte Entomologie* **6:** 185–246.

Cerretti, P. & Tschorsnig, H. P. 2010. Annotated host catalogue for the Tachinidae (Diptera) of Italy. *Stuttgarter Beiträge zur Naturkunde, A, Neue Serie* **3**: 305–340.

Folmer, O., Black, M., Hoeh, W., Lutz, R. & Vrijenhoek, R. 1994. DNA primers for amplification of mitochondrial cytochrome c oxidase subunit I from diverse metazoan invertebrates. *Molecular marine biology and biotechnology* **3**: 294–299.

Forestry Commission 2013. *Oak Processionary Moth: 2013 Control Programme Review Report*. Forestry Commission, Dorset.

Ghahari, H., Hayat, R., Chao, C. M., & Ostovan, H. 2008. A contribution to the dipteran parasitoids and predators in Iranian cotton fields and surrounding grasslands. *Munis Entomology & Zoology* **3**: 699–706.

Grison, P. 1952. La Processionaire du Chêne (*Thaumetopoea processionea* L.) dans la region parisienne. *Revue de Pathologie Végétale et d' Entomologie Agricole de France* **31**: 103–114.

Hubenov, Z. 2008. Composition and zoogeographical characteristics of the family Tachinidae (Diptera: Insecta) in Serbia and Bulgaria. *Advances in Arachnology and Developmental Biology, Monographs* **12**: 375–394.

Kara, K., & Tschorsnig, H. P. 2003. Host catalogue for the Turkish Tachinidae (Diptera). *Journal of Applied Entomology* **127**: 465–476.

Maksymov, J. K. 1978. Thaumetopoeidae, Prozessionsspinner. In *Processionary moths and climate change: An update* (ed. by A. Roques), pp. 53. Springer, London.

Stigter, H., Geraedts, W. & Spijkers, H. 1997. *Thaumetopoea processionea* in The Netherlands: Present status and management perspectives (Lepidoptera, Notodontidae). In *Proceedings of the Section Experimental and Applied Entomology of The Netherlands Entomological Society* **8**: 3–16.

Townsend, M. 2013. Oak processionary moth in the United Kingdom. *Outlooks on Pest Management* **24**: 32–38.

Tschorsnig, H-P. 1993. Parasitoide aus dem Eichenprozessionsspinner. *Forstliche Versuchsund Forschungsanstalt Baden-Württemberg* **2**: 3–6.

Tschorsnig, H-P. & Wagenhoff, E. 2012. On the oviposition of *Phorocera grandis* (Tachinidae). *The Tachinid Times* **25**: 3–7.

Vanhara, J., Tschorsnig, H. P., Herting, B., Mückstein, P., & Michalková, V. 2009. Annotated host catalogue for the Tachinidae (Diptera) of the Czech Republic. *Entomologica Fennica*, **20**: 22–48.

Zeegers, T. 1997. Tachinid flies (Diptera: Tachinidae) from Dutch *Thaumetopoea processionea*. *Entomologische Berichten Amsterdam* **57**: 73–78.

SHORT COMMUNICATION

The Wellingtonia Bug, *Orthotylus caprai* Wagner (Hemiptera: Miridae), goes forth. – This small, green capsid bug was first discovered in Britain in 2006 on Wellingtonia, *Sequoiadendron giganteum* (Lindl.) Buchholz (Cupressaceae), in University Parks, Oxford (Ryan, 2008). The insect was confined to the trees standing in the north-west corner of the park. A search of Wellingtonia and other conifers in the Parks and elsewhere in the city had failed to find more of the animal. This highly localised distribution suggested the possibility of a recent colonisation, and I therefore undertook to monitor the bug's status year by year, hoping to chart its dispersal across the city and elsewhere.

This project was a miserable failure, and I was forced to conclude that the insect was merely very local in its habits, and may have been present in the Parks for some time. There had been no reports of the animal from anywhere else in Britain. A sighting in Kingston, Surrey turned out to be the similar *Orthotylus junipericola* Linnavuori (Hodge, 2008 & 2014). So, the status of *O. caprai* in Britain rested solely on Wellingtonia in a single location in Oxford, and nowhere else.

However, just as I was about to write a further article on the bug, under the working title of "*Orthotylus caprai* stays put", the situation started to change. On 30 July 2014, I found the animal outside the Parks for the first time, on a Wellingtonia in front of the nearby Oxford University Museum. Inside the Parks, I found the bug on a new species of tree, Smooth Arizona Cypress, *Cupressus glabra* Sudw. (Cupressaceae). Given that this tree was in the immediate vicinity of the Wellingtonia, these animals could have been strays, so I resolved in the following year to visit slightly earlier in the summer to try to find nymphs, and confirm the tree as a host. On 25 July 2015, adults and nymphs were indeed found and the latter were reared to adult to confirm their identity. Two days later, adults and nymphs were also found on a Leyland Cypress, × *Cupressocyparis leylandii* (Jacks. Dallim.) Dallim., 100m to the east, and adults on a Monterey Cypress, *Cupressus macrocarpa* Hartw., on the opposite side of the Parks, close to the Genetic Garden. I checked the claspers of all my male specimens (which are easily plucked from the apex of the abdomen using fine forceps), and confirmed that this was not an invasion of *O. junipericola*, but was *O. caprai* in each case.

On 31 July, I found the bug for the first time (appropriately) in Wellington Square, close to my home. The Wellingtonia tree here had been checked every year, without

result, until now. Later that day, I visited Hinksey Park, in south Oxford, which was last examined on 10 August 2012. Here adults and nymphs of the bug were taken on both Wellingtonia and Leyland Cypress. Given that this location is south and west of the River Thames, it lies in Watsonian Berkshire (VC22), providing a new vice-county record for the insect. In the course of other project work, I took the bug on Wellingtonia in the city cemeteries of Wolvercote and Botley, on 15 August.

Outside Oxford, I stumbled across the bug in Garth Park, Bicester, Oxfordshire on Wellingtonia and Monterey Cypress on 9 August. Two Leyland Cypress in Vale Park, Aylesbury were also found to have the animal, on 2 August, adding Buckinghamshire (VC24) to the list of recorded vice-counties. I had not visited these sites previously, so cannot say for how long the animal had been here. If the animal is a recent arrival to these sites, there is no reason to believe that it had spread from Oxford. The Oxford site had been the first and only *known* site for *O. caprai*. There is no good reason to doubt that there had been other, similarly local sites, at which the bug has yet to be found by heteropterists.

It is not without precedent for a very local bug to suddenly become more widespread in its distribution, as the recent example of *Gonocerus acuteangulatus* (Goeze) (Coreidae) (Bantock & Stewart, 2013) demonstrates. However, such range expansions are interesting, and it remains to be seen how far *O. caprai* will spread within the British Isles. – R. P. RYAN, 38 St John Street, Oxford OX1 2LH (email: *RobRyanBugs@gmail.com*).

REFERENCES

Bantock, T. & Stewart, A. 2013. Wildlife report. *British Wildlife* **24**: 277–279.
Hodge, P. J. 2008. A second British site for the mirid *Orthotylus caprai*. *Het News* **12**: 16.
Hodge, P. J. 2014. Exhibit. *British Journal of Entomology and Natural History* **27**: 123–124.
Ryan, R. P. 2008. *Orthotylus caprai* Wagner (Hemiptera – Miridae) new to Britain. *Entomologist's Monthly Magazine* **144**: 129–130.

ANNOUNCEMENT

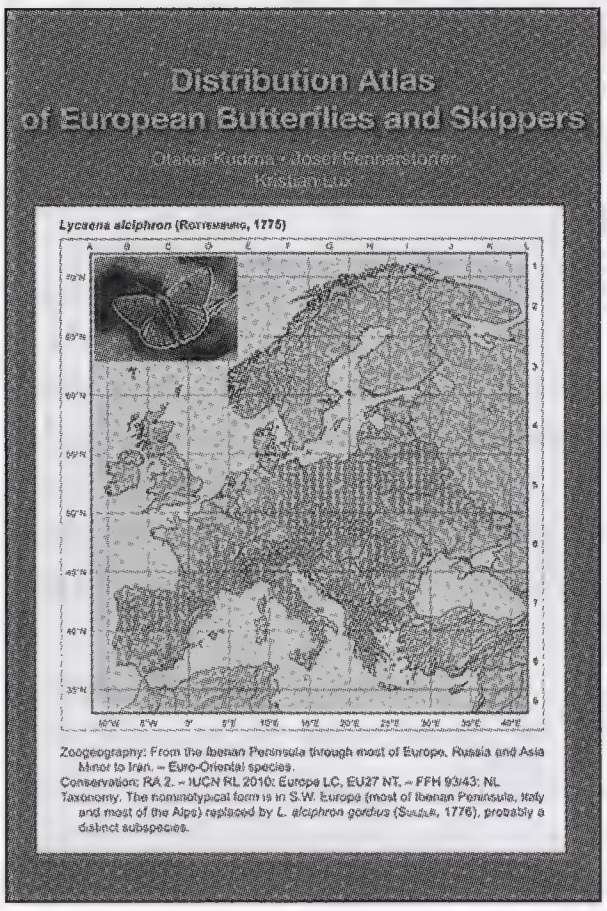
Digital insect specimen photography with Helicon Focus 6 computing software and rotating specimen stages

Member Mike Taylor has published two papers in the Journal on techniques for taking close-up photographs of insects (Taylor, 2001, 2004). Since then he has made numerous improvements and the latest version of his article on his Insect Digital Photography Workstation can be downloaded from his website at *miketaylornaturalist.co.uk*. Links to this can also be found on the Society's website where a previous version of the article can be accessed (Taylor, 2012). The article is worth reading just to see a huge number of stunning insect close-ups.

REFERENCES

Taylor, M. J. 2001. The Development of a Practical Technique for Achieving Realistic Photographic Images of Set Insect Specimens. *British Journal of Entomology and Natural History* **14**: 193–206.
Taylor, M. J. 2004. The Digital Photography of Set Insect Specimens. *British Journal of Entomology and Natural History* **17**: 25-33.
Taylor, M. J. 2012. Insect Digital Photography Workstation. www.benhs.org.uk, www.miketaylornaturalist.co.uk.

BOOK REVIEWS


Distribution Atlas
of European Butterflies and Skippers
Otakar Kudrna • Josef Pennerstorfer
Kristian Lux
Lycaena alciphron (Rottemburg, 1775)
Zoogeography: From the Iberian Peninsula through most of Europe, Russia and Asia Minor to Iran. – Euro-Oriental species.
Conservation: RA 2. – IUCN RL 2010: Europe LC, EU27 NT, – FFH 93/43: NL
Taxonomy. The nominotypical form is in S.W. Europe (most of Iberian Peninsula, Italy and most of the Alps) replaced by L. alciphron gordius (Sulzer, 1776), probably a distinct subspecies.

Distribution Atlas of European Butterflies and Skippers by Otakar Kudrna, Josef Pennerstorfer & Kristian Lux., 632pp. 2015. Wissenschaftlicher Verlag Peks eK., Schwanfeld, Germany. ISBN 978-3-938249-71-0. Price from £54 (Pemberley Books), up to £79.99 elsewhere.

Anyone with a deep interest in European butterflies needs access to an authoritative and up-to-date reference work covering distribution, taxonomy and conservation. Until 2011, those features were not available within a single volume, and lepidopterists had to make do with popular field guides with their thumb-nail distribution maps, outdated nomenclature and imprecise comments on rarity and conservation. The publication of the Distribution Atlas of Butterflies in Europe (MEB-2) in 2011 laid a fresh milestone and set a common baseline for the future. Now the output of the Mapping of European Butterflies project, phase 3 (MEB-3) has provided the Distribution Atlas of European Butterflies and Skippers as an expanded and updated replacement volume.

Field guides have their place of course; in a compact book they include photographs for identification and provide vernacular names. The Distribution Atlas does neither. Its 632 pages weigh in at 1.65 kg; it features colour distribution maps, and uses scientific nomenclature throughout. Most maps feature a small photograph of the species as a reminder, but insufficient to use for full identification. Nonetheless, this is a useful feature not found in MEB-2. A total of 407 maps cover the species of Continental Europe (in a few cases, a complex of species is covered on one map). Including the endemics of the Macaronesian islands, the total species cover is about 445.

This is a volume mainly for serious lepidopterists, for students or amateurs seeking to upgrade their knowledge, but it is not a book for everyone's rucksack. It is a multinational product, on a pan-European topic, written entirely in English, and of value to conservationists and general naturalists as well as entomologists.

Chapter 4 covers the taxonomic background, describing the development of classification over the years, the use of DNA techniques for discrimination and the importance of correct use of the International Code of Zoological Nomenclature. The resulting taxonomy reallocates a number of species to genera other than those in longstanding use. A definitive systematic checklist of species is provided, and this is followed by two further lists covering synonymy by Genus groups (c.250 entries), and by Species groups (c.750 entries). For clarity, in both synonymic lists, valid entries are in **bold print** and synonyms are not. These lists will prove useful in resolving queries concerning the evolving taxonomy of our butterflies. The importance of genitalia in the classification of species is covered, and a selection of 42 excellent male genitalia photographs in colour are presented, with the observation that Higgins' line drawings of 1975 have never been superseded. The index to the distribution maps is presented firstly by Genus, species and then re-arranged by species, Genus. This is the simple way to find the right map as the sequence of

the map pages is semi-systematic. For some reason, the main index is situated 80 pages before the end of the book, ahead of various gazetteers, references and acknowledgments. The useful page headers of MEB-2 have been discontinued, making it harder to find one's place in the new volume.

The core of the atlas is familiar to users of MEB-2, but with several refinements. It comprises mapping for all species of butterfly found in Europe. Each map is about 20 times the size of the usual thumb-nail, and takes up most of the (larger than A5) page. Red blobs show pre-1951 records, yellow 1951–1980, and green from 1981 to date. These time blocks are unchanged from MEB-2, although fresh records from 2011 to date have been added into the green category. The background map is paler than MEB-2, and shows rivers as well as national boundaries and mountain shading. Lat & Long are clearly shown on two sides, with an alphanumeric grid on the other two sides allowing each Geodetic Recording Block (GRB) of 5 degrees of latitude by 5 degrees of longitude to be numbered, e.g. GRB 2B, etc. Each block subdivides into 50 basic recording fields (10 north-south by 5 east-west) of half a degree of latitude by a degree of longitude – approx 50km square. This allows up to 50 blobs in each GRB, providing much better definition than thumbnails. The recording system using Reference Localities remains unchanged from MEB-2. The extra geographic features make some maps appear cluttered compared to MEB-2. Below each map are compact notes on the Zoogeography, Conservation Status, and (where relevant) Taxonomy of each species. At first glance, this appears to be in code, but an enormous amount of information has been presented, and the conservation status codes are explained in the text ahead of the maps [Section 6.1].

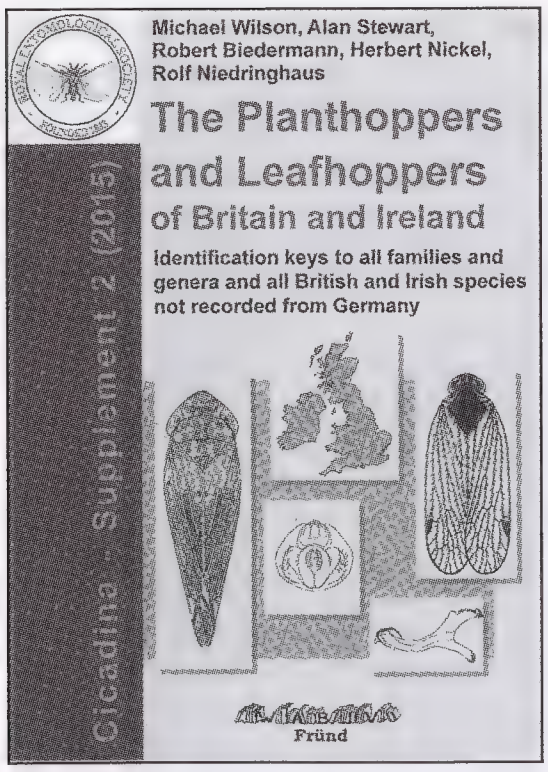
The species found in the Azores, the Canary Islands and Madeira are not mapped individually, but are covered separately in a table following the maps. Brief monographs of 26 endemics from these island groups follow the table.

The species maps are followed by interesting analysis of the state of recording – nation by nation, an evaluation of the distribution data, by nation, by species, and by zoogeographic composition. The distribution of each species is tabulated as the number of BRF blobs on the map and that as a percentage of Europe. *Maniola jurtina*, for example, is found in 68% of Europe, whilst *Maniola helicarnassus* weighs in with a mere 0.05%. This is followed by a section on the implications for butterfly conservation and a map showing species diversity.

Any work of this magnitude must inevitably include a few typos and data errors. The former are self-evident, whilst the latter may be in the detail and yet to be detected. Dr Kudrna was disappointed with errors in MEB-2, and his account of Twenty Years Mapping European Butterflies (following his Preface) is a very personal account of the trials and tribulations he encountered bringing the project from concept to realization.

In summary then, the new Distribution Atlas provides a great deal more than its superb distribution maps. For the specialist it provides a wonderful source of reference on taxonomy, zoogeography and conservation. For the amateur, it offers an authoritative nomenclature and opens a route to deeper study. The taxonomic nomenclature it provides is meticulously justified, and deserves to gain general acceptance.

ROB PARKER



The Planthoppers and Leafhoppers of Britain and Ireland. Identification keys to all families and genera and all British and Irish species not recorded from Germany. Cicadina-Supplement 2. By Michael Wilson, Alan Stewart, Robert Biedermann, Herbet Nickel and Rolf Neidringhaus. Wilhelm Brüggermann, GmbH, Bremen, 2015. Softback 138pp. £35.00. ISBN 978-3-939202-06-6.

Sixty years ago in 1965, Walter Le Quesne published his first of four Royal Entomological Society Handbooks on 'British Auchenorrhyncha', the last part with Keith Payne, lovingly referred to as Vol.II Part 2(c), in 1981. These introduced British entomologists to a leafhopper fauna considerably greater than that described by James Edwards' in his superb colour monograph on British Homoptera published in 1896. Walter brought order from chaos, working his way steadily through the British fauna, genus by genus, and publishing his results at regular intervals in the Entomologist's Monthly Magazine. Amazingly, Walter was a chemist by profession, so all of his taxonomic studies were done in his spare time. Despite his advances, the handbooks, the only British ones produced in the 20th century, left a little to be desired: there were just four whole insect illustrations (all in b/w) covering the sub-orders Cicadomorpha and Fulgoromorpha, a total of 350 British species, such that any aspiring novice at the time had the daunting task of trying to comprehend the rich diversity of shape and form of the whole group based mainly on odd bits of head, thorax and (mostly) genitalia. This is because there were no popular books on Auchenorrhyncha then available as back-up, perhaps the odd b/w figure in a textbook; just imagine today trying to study Lepidoptera using figures of body parts and no photographs to help you (well, think Meyrick, 1895).[1] Sometimes key features separating taxa in his thumb-nail sketches were difficult to locate with certainty, and the occasionally long, descriptive couplets were also a challenge: finding the ogive arch in *Cixius* was a particular favourite of mine.

We move to the present. The current book by Mike Wilson and colleagues looks and handles like an RES handbook, but *it isn't*: it is Cicadina Supplement 2 of *Die Zikaden Deutschlands* originally compiled by Robert Beidermann and Rolf Neidringhaus and published in 2004. The Royal Entomological Society however, kindly contributed to publication of the new Supplement. Co-author Herbert Nickel provides host plant records based on his extensive studies of the European mainland fauna, and Alan Stewart, as Auchenorrhyncha Scheme Organiser for the UK of many year's standing, provides up-to-date distributional and status information. The book is therefore a real synthesis of all we know about 'planthoppers and leafhoppers' in our region, written and illustrated by Europe's premier auchenorrhynchologists. This joint effort works extremely well, and is perhaps best exemplified by the book's front cover, which emblazoned as it is with 12 objects and text in different fonts is somewhat reminiscent of the end credits for an EU-funded Canal 4 production. It is eye-catching though!

The authors begin with a comprehensive and highly informative Introduction, with sections on Faunistic and Biosystematic studies (i.e. separation of sibling species using bioacoustics, behavioural and molecular techniques), Species not in Biedermann & Neidringhaus (2009), Features of the British and Irish fauna, Recent

Changes and Species of Conservation Status. This is a must read for anyone who has an interest in British and Irish bugs. This is followed by the Checklist of Auchenorrhyncha found in Britain and Ireland.[2]

Although classification of the order Hemiptera has been under intense scrutiny in recent decades with more than 18 phylogenetic trees proposed for Auchenorrhyncha alone, the authors have adopted a fairly conservative approach based on a consensus view of the two lineages by European taxonomists formulated 20 or so years ago. The higher level changes made since Le Quesne include division of the genera *Aphrodes* and *Idiocerus* into a number of new genera and separation of Cercopidae into Aphrophoridae and Cercopidae (s.s.). The common names used for these two families seem to be at odds with the known biology of British species at least. All our aphrophorids, so-called 'froghoppers' including the common spittle-bug *Philaenus spumarius* (sic), produce copious amounts of spittle in their nymphal stages and their spittle masses on most types of vegetation are a familiar sight in early summer in many parts of the world. This contrasts with our one species of so-called 'spittlebug', *Cercopis vulnerata*, a striking red and black hopper which produces spittle below ground so you *never* see it. It would seem sensible to swap round the common names of these two families at the earliest opportunity. The authors though, very wisely refrain from using subgeneric names for certain genera in the Checklist which I applaud, as their intended usefulness invariably ends up causing more problems than it solves.

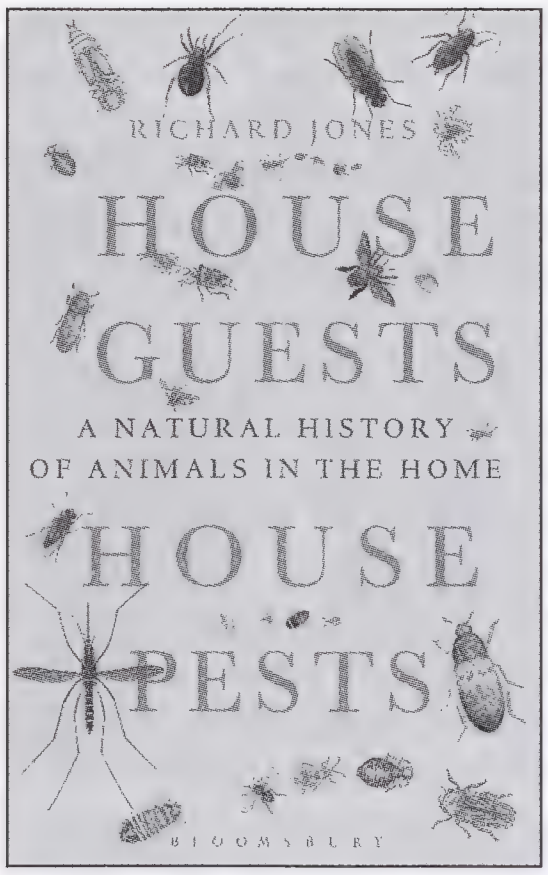
Identification of the British fauna, now numbering 402 species, in a single slim volume (compared to the previous four books) is achieved, masterly, through the use of extensively-illustrated dichotomous keys. No long, tortuous descriptions here! Keys are to genus level, with illustrations showing the range of species within a genus (but not necessarily *all* species in a large genus) on the page opposite. Where species occur in the UK *and* in Germany (vis. the majority), readers are directed to the more detailed accounts and much larger illustrations given in the English version of *Die Zikaden Deutschlands* (2009). Only those 19 species which have *not been found* in Germany but occur in the UK are fully treated and illustrated in Supplement 2. Host plant nomenclature follows Nickel (2003) rather than modern DNA-based floras such as Stace (2010). The authors state that the overall approach taken offers the benefits of low cost, but this is only true if you happen to have already bought *The Planthoppers and Leafhoppers of Germany* (2009) (luckily I have, so no problem).

All-in-all, the authors are to be commended for producing a highly 'readable' up-to-date definitive key to the British and Irish species of Auchenorrhyncha at a reasonable price.

JOHN BADMIN

Footnote 1. This is why the Royal Entomological Society published *The Royal Entomological Society Book of British Insects* by Peter Barnard in 2011 with photographs of examples from each family of British insects.

Footnote 2. With up-to-date checklists on the British Auchenorrhyncha and most families of the Sternorrhyncha (aphids, psyllids, whiteflies and scales) now published, and provisional lists to British Heteroptera (available electronically on line) it should surely be a relatively easy task to combine and publish a complete Checklist to British Hemiptera in one volume. The last one was published over 60 years ago.



House Guests, House Pests. A Natural History of animals in the Home by Richard Jones. (Bloomsbury Publishing, 2015). 256 pp. Hardback £16.99. ISBN 978-1-472906-23-6.

The author, a former editor of this journal for many years, is well-known for his entertaining blend of authoritative and amusing styles of writing – and again he does not disappoint. His chosen subject this time, homes and their associated animals, abounds with fascinating stories of the successes and failures of (mainly) insects as they adapt and exploit the changing environment we live in. Since the dawn of civilization, approximately 13,500 years ago and now the dawn of global overheating in the anthropocene, we have lived together, *H. sapiens* we like to believe in the driving seat.

The titles of each chapter give a flavour of the overall tone of the book: (Chapter 1, 'Introduction' – our first big mistake was coming down out of the trees; chapter 6, 'Eating the house and home' – woodworm, clothes moths and carpet beetles, the end of civilization as we know it) and each succeeding chapter covers a different aspect of our home existence through to the modern day. Civilization, the author sighs 'has brought mankind great advantages, but it has brought with it many hangers on'. It is estimated that c. 3000 animal species have been recorded as living in, invading, or destroying or otherwise polluting human habitations.

Early proto-dwelling associates we learn include fleas and lice (a fascinating co-evolutionary story) and the author is proud to report that he may be the only person to have exhibited a live head louse plucked from his head at a meeting of a national entomological society (no guesses as to which one). Did we make a mistake when inventing pottery, discarded pots acting as novel breeding sites and stepping stones for mosquitoes to track our movements across the wider landscape? He muses that many of our problems began when we invented the front door, thereby defining and separating 'our space' from 'others, aka the outside'. Inside our home is very attractive to insects, providing dry shelter, warmth, food and avoidance of natural predators and parasites. Those that make it indoors are considered to be synanthropes but there seem to be no simple equivalent names for species that live in the surrounding garden/farmed landscapes which we inhabit, apart from some terribly long ones, never intended for normal conversation.

Each chapter is full of new and interesting facts. For example I didn't know about Pharaoh's ant being in Chelsea: it was given its name in 1758 based on specimens collected from Egypt, and the dawning realization that it is a super tramp species hitching lifts with us all over the globe – and has probably been doing so for thousands of years, means its true home may never be known. There are insects taking advantage of our stored foods, and a lot more different species where we throw our food away. Beetles and silverfish behind kitchen sinks and social wasps in cavity walls. Whatever next? Bumblebees in the roof it seems! (see journal front cover). The trend for building green roofs (especially in Germany and Switzerland) invites an entirely new suite of guests.

The final two chapters 'To live and let live? Or squish 'em? – how to deal with your own visitors' and an 'Appendix – Rogues gallery and identification guide' are self-explanatory. The author provides sensible advice on what to do with an invader, namely to determine the nature and extent of the problem (usually a passing insect) and in most cases to simply collect and eject the creature from the house via the back door (a later invention). He half admits that his own abiding interest in and love of insects may lead him to merely study the question for a little longer than is perhaps necessary, whereas your average person (not a logically-minded entomologist of course) wants the problem – the insect – removed straight away. He is somewhat unconvinced by the use of and performance of insect repellents or sprays to control unwanted guests despite huge amounts of literature and journals devoted to the subject. Those of us living in temperate climates rarely encounter insects as pests, those in the tropics certainly do. For example, control of cockroaches in inter-connecting blocks of flats in cities, particularly tropical ones is completely beyond the scope of individual flat owners and requires integrated action. Many of our unwelcome visitors are 'no-see-ums' so you cannot simply show them the door and a combination of strategies is required for their removal. Small mosquitoes, of the female biting variety, some infected with deleterious human diseases, can, for example, average 200 individuals per mud hut per night, high season.

The concluding chapter, the appendix, aims to give more information on selected species, mostly insects, as well as a few mammals, reptiles and birds, some of which we welcome as guests, such as swallows and house martins. The insect illustrations are of sufficiently high quality that intelligent readers should be able to identify which types of insects they have before them. This neatly rounds off the book, certainly from a publisher's viewpoint. However in real life we know that many members of the public cannot tell the difference between a hoverfly and a hornet, a beetle or a bug, let alone a vast array of mini-beasts and they may skip through this chapter. Still, all the information is there for any inquisitive reader to find if they need it.

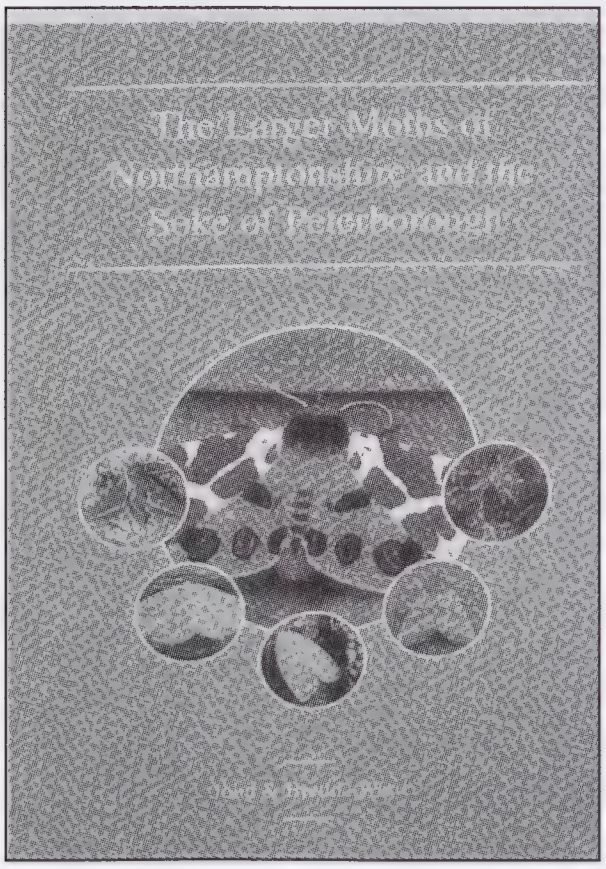
Finally, I owe an apology to the author and publisher for my delay in providing a review. My advanced xerox draft (thank you) had alternate pages upside down and back-to-front and reading it was not an easy task. I know the published version is fine and recommend it to all.

JOHN BADMIN

Here I should admit to a certain amount of shared interest in the subject as for a number of years I headed a team responsible for improving the biological performance of Temana International's range of domestic consumer products, some for insect control, many designed for use under tropical conditions where pest pressure is real (not like in the UK). Trying to control 'evolving pests' is never easy, but certainly a challenge and sometimes fun. Real ingenuity is required if you wish to be the world's no.1 company. In response to the market's need for a safer, more targeted method of fly control than basic aerosol sprays, we developed an entirely novel approach, 'Insectipen', a pen containing a new type of highly active insecticide that with one stroke of the pen drawn across a window pane controlled household flies for weeks. This used of the order of a millionth less insecticide than previous approaches. Success though was temporarily dampened by a Swiss company plagiarising and marketing our idea, selling an ever bigger brighter pen than ours, but, because we had a research note written by a physical chemist explaining in detail why our pen could not possibly work we were able to protect our patent 'as being an entirely unexpected/novel invention' (and it goes without saying the chemist was

promoted not long after). The first two year's sales were exceedingly good but dropped quite a bit in the following year. Then some bright spark thought to ask how many windows could one pen mark, which we had never considered before, as we used ready-made pens bought off the shelf (initially from the local stationery shop). The answer, after some roller tests and interesting bioassays was of the order of 10 housing estates. A real Rolls Royce product. I will admit we developed a smaller, mark 2 pen, with sufficient insecticide just to cover 1–2 fly seasons in order to maintain market share. We even created wealth for UK plc. Today, I use the pens for protecting specimens from unwanted guests in my insect cabinets.

JOHN BADMIN



The larger moths of Northamptonshire & the Soke of Peterborough. Compiled by John & Brenda Ward. Self-published 2015. 189pp. Softback only. £18.55 including p&p. Available from the authors by cheque in post to 109 Blandford Avenue, Kettering, Northamptonshire NN16 9AS (Tel. 01536 483310).

This concise little book is the first published county moth list for Northamptonshire since that published by Eustace Wallis in parts between 1908 and 1912. It is both most welcome and authoritative.

John Ward has lived in Northamptonshire all his life and his interest in moths started as a boy. He has been the county moth recorder from 1977 until publication of this book, and has now handed the post to Mark Hammond. Mark is known to all of us recording moths in the county because he has been John's assistant since the mid-1990s and co-ordinates the Northamptonshire Moth Group. I have been corresponding with John and contributing my records from the county to him since I came to live in the vice-county of Northamptonshire in 1987 and, via his assistant Mark since the 1990s. I have been impressed with their dedication and depth of knowledge of the subject. I have also joined them for fieldwork. This book sets out to summarize the current status, distribution, habitat and flight season for all 648 of the species of larger moths recorded to date from the vice-county of Northamptonshire, including the Soke of Peterborough, based on all the data collected by the current network of recorders in the county. It also aims to summarize the recorded history of all these species in the county, based on the literature and specimens left by those who preceded us, from the earliest published moth record, which dates from a visit Henry Doubleday made to the county in 1841. Summaries of the comments in the previous county listing of 1908–1912 are also included, which is very useful for comparative purposes. Up to four sites where the species has been recorded are named, as places to look for the species, with preference given to recognised wildlife conservation sites. Larval food-plants within the county and other observations on the immature stages are generally not covered, with the exception of some of the species which are conspicuous as caterpillars, some of which are illustrated by photographs at the back of the book.

The arrangement of the species and the nomenclature follow the recent British checklist of Agassiz *et al.*, 2013.

The text follows closely the condensed format developed on the Northamptonshire Moth Group website (www.northamptonshirewildlife.co.uk/nmoths/nmothsindex.htm) but includes more information. This comprises about 7 to 14 short lines of text per species. Virtually all the species are illustrated as adults, with a small colour photograph alongside the text. For the majority of the more localised species a distribution map is included. This shows the 10km squares within the vice-county for which there are records. These are differentiated into eras. A large yellow spot indicates that there are records from 2000 onwards. A large orange spot indicates the species was recorded between 1980 and 1999 but not since. A medium-sized spot informs that the species was seen between 1961 and 1979 but not since. A small orange spot records that the species has only been recorded prior to 1961. This is useful for showing patterns of decline, such as for the Garden Tiger *Arctia caja*, and certain other changes in distribution. Notes in the text add explanation.

The book contains a Site Gazetteer listing six-figure map references for sites named in the accounts, and a series of impressive site photographs and descriptions for a selection of 25 sites with wildlife conservation designations and which have been surveyed for moths.

There is also a section on ten of the early and most active recorders of the moths of Northamptonshire. This gives a very informative paragraph on each, presented chronologically. It starts with the Rev. Hamlet Clark (1823–1867), who was an active collector who published his earliest moth records in "Captures near Towcester" in *The Entomologist* of 27th August 1842: 409–410. Clark was well-known to Edward Newman, who wrote his obituary. This section on recorders ends with Peter Gent (1917–1998) who was the county moth recorder until 1977 when he stepped down and John Ward took over.

A brief bibliography and reference list is provided. This concentrates mainly on identification guides and on some of the very oldest literature on the moths of the county, generally from the nineteenth century. There is also a brief list of some useful websites.

John, and his wife Brenda, who typed and laid out the book, are to be congratulated on compiling a huge amount of information into such a concise and clear volume, which they have self-published and are selling at the cost of the printing. I find the contents particularly interesting because I live in the county and record moths widely there, but the book will interest all moth recorders in neighbouring counties, and those who collect county lists throughout the British Isles. Only 150 copies have been produced, so I suggest you order soon to make sure of your copy.

PAUL WARING

REFERENCE

Agassiz, D. J. L., Beavan, S. D. & Heckford, R. J. 2013. *Checklist of the Lepidoptera of the British Isles*. Handbooks for the Identification of British Insects. Royal Entomological Society.

FIELD MEETING REPORTS

Borough Fen Duck Decoy, Newborough, near Peterborough, Cambridgeshire, 9–10 September 2013

Leader: **Paul Waring**. – This field meeting was added to the programme at the short notice of only a week or so, and only advertised by phoning round a few locally-based mothing contacts. Four BENHS field meetings have been held previously on this site and the results published in the Society's journal, so this brief report is included for completeness, especially because it includes some noteworthy records. The leader decided to return to this wetland site in the hope of recording some wainscot moths. In the event the leader was only accompanied by Sonu Pradhan (Fig. 1), who is just starting to take an interest in the local wildlife. A pair of Little Owls *Athene noctua* flew from tree to tree ahead of us, all the way to the entrance. A Heath trap with a 6W actinic tube on a car battery was placed at TF 19961 08090 +/− 5m and left operating all night by a horn of the decoy. The trap-site was selected in the hope that wainscot moths dependent on the Common Reed *Phragmites australis*, Reed Sweet-grass *Glyceria maxima* and Bulrushes *Typha latifolia* out of reach elsewhere on the margins of the lake might follow the horn-like extension of the water-edge and encounter the trap.

The trap was left unattended all night and inspected at 8.45 h the following morning, when it was still in the full shade of the tree canopy. It contained 14 macro-moths of seven species. Most numerous species were the Large Yellow Underwing *Noctua pronuba* L. (4), with Snout *Hypena proboscidalis* (3), Setaceous Hebrew Character *Xesta c-nigrum* (L.) (2), Green Carpet *Colostygia pectinataria* (Knoch) (2),

Fig. 1. Sonu Pradhan and site manager Ian Newton by a horn in the decoy, 2013.

Fig. 2. Huge numbers of hornets in the Heath trap, 10 September 2013. Photos: P. Waring.

and single individuals of the Broad-bordered Yellow Underwing *Noctua fimbriata* (Schr.), Vine's Rustic *Hoplodrina ambigua* (D. & S.) and Pale Mottled Willow *Paradrina clavipalpis* (Scop.). It also contained one other species of moth, the pyralid *Schoenobius gigantella* (D. & S.), two individuals, dependent on Common Reed and Reed Sweet-grass. So the trap had been successful at intercepting one species of moth associated with the emergent plants around the lake, all be it not a macro-moth. The trap (Fig. 2) was also full of Hornets *Vespa crabro* L. (53 individuals)! The night had been a cool, clear, dry one with a light breeze. All of the moths were sluggish and some of the hornets had died of the cold.

Ivan Newton (Fig. 1), who joined us in the morning, reported that he had seen a Silver-washed Fritillary butterfly *Argynnis paphia* (L.) on this site on 8 August – the first record for this site, which has been inspected for butterflies continuously since the 1980s. This species has been dispersing locally and is increasing its range. It will be interesting to see if there is successful colonisation of this site over the following years.

Ivan also reported seeing a Red Underwing moth *Catocala nupta* (L.) on 15 August 2013. This species has been recorded by the leader on at least one previous visit (11 August 2009, *BJENH* **26**: 56).

The leader would like to thank the owners of the Decoy (Ann and Rodney Fletcher) and the site manager (Ivan Newton) for permission and facilitation of this meeting within the Decoy, and Judith Jacobs for her permission and help to trap on the adjacent farmland. The records have been supplied in full to the county moth recorder for vice-county Northamptonshire (Mark Hammond) which includes the Soke of Peterborough, now assigned to the modern administrative county of Cambridgeshire.

Beale Park Bioblitz, Berkshire, 3 July 2015

Leader: **Ian Sims**. – This field meeting, jointly held with the British Entomological and Natural History Society and Berkshire Moth Group (BMG), was arranged to coincide with a 24-h Bioblitz which has been an annual event at various times of the year at Beale Park since 2010. Previous meetings (*BJENH* **27**:141–142 & **28**: 61) have been very successful, and this was the case this year, despite an unfortunate clash of dates with the BMG's calendar which saw most of that group trapping down at Sandwich Bay for the weekend. Consequently, there were just three attendees at this event, including the leader, but we managed to run a total of four 120w MV lights all night (from 21.45h on the 3rd to 05.00h on the 4th). After some welcome chilli, followed by a reconnoitre of the park, sites for trapping were chosen and our equipment deployed.

The weather was perfect for mothing, though distinctly eerie from around half past midnight to about 01.30h. The sky was repeatedly lit with intense and blindingly bright flashes of lightning, though there was no thunder accompanying it! The temperature was positively hot, being around 18°C (which was maintained for most of the night) and there was absolutely no rain or wind, not even a breeze. Very odd indeed, and quite a privilege to experience.

Moths were recorded throughout the night, and by the morning a total of 158 species had been amassed (107 macros and 51 micros). Of these, the most notable records were Leopard *Zeuzera pyrina* (L.) (a male and female), the Festoon *Apoda limacodes* (Hufn.), *Tinea semifulvella* Haw., Bird-cherry Ermine *Yponomeuta evonymella* (L.) (adult to light, and evidence of larvae on Bird-cherry for the third year running), Figure of 80 *Tethea ocularis* (L.), Clay Triple Lines *Cyclophora linearia* (Hübn.), Large Twin-spot Carpet *Xanthorhoe quadrifasiata* (Cl.), Brown Scallop *Philereme vetulata* (D. & S.), Privet Hawk *Sphinx ligustri* L. (three to light after midnight), Pine Hawk *S. pinastri* L. (many examples, but all worn), Eyed Hawk *Smerinthus ocellata* (L.) (two examples), Small Elephant Hawk *Deilephila porcellus* (L.), Lobster *Stauropus fagi* (L.), Maple Prominent *Ptilodon cucullina* (D. & S.), White Satin *Leucoma salicis* (L.), White-point *Mythimna albipuncta* (D. & S.), Reddish Light Arches *Apamea sublustris* (Esper) and Oak Nycteoline *Nycteola revayana* (Scop.). But probably the best record was a single example of the pyralid *Oncocera semirubella* (Scop.) that came to light around midnight. A single record of the large gelechiid *Metzneria lappella* (L.) was also nice to see.

Other orders recorded were:

Coleoptera – Glow-worm *Lampyris noctiluca* (L.), Summer Chafer *Amphimallon solstitiale* (L.), Harlequin Ladybird *Harmonia axyridis* (Pallas).
Hemiptera – Birch Shield bug *Elasmostethus interstinctus* (L.)
Ephemeroptera – *Ephemera lineata* Eaton.
Hymenoptera – Hornet *Vespa crabro* L.

The following day Dave Coles (Beale Park head warden) led the remaining part of the Bioblitz event, but the leader did not remain for this.

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